From:	Proctor jr., Kennard
To:	SCO
Cc:	Seiler, Ann; Senn, Nate
Subject:	Okeechobee Clean Energy Center - Post Certification Amendment Request-No. PA15-58: Potable Water Treatment Plant System
Date:	Sunday, April 2, 2023 9:38:54 PM
Attachments:	OCEC Plant Amendment Request -Water treatment plant - 3-31-2023.pdf ATTACHMENT-A- 62-555.900 (1) Specific Permit_OCEC_2023-03-02.pdf ATTACHMENT-B - Preliminary Design Report-3-31-2023.pdf

EXTERNAL MESSAGE
This email originated outside of DEP. Please use caution when opening attachments, clicking links, or responding to this email.

Good afternoon,

Please find attached a Post Certification Amendment Request submittal for the planned construction of an improved potable water treatment plant system at the FPL Okeechobee Clean Energy Center. Please contact me if you have questions or need additional information. Thank you.

Sincerely,
Ken Proctor, PMP
Sr. Project Manager
Environmental Services
Florida Power & Light Company
Office: (561) 691-7068
Cell: (561) 267-9138

This transmission is intended to be delivered only to the named addressee(s) and may contain information that is confidential and/or legally privileged. If this information is received by anyone other than the named addressee(s), the recipient should immediately notify the sender by E-MAIL and by telephone (561) 691-7068 and permanently delete the original and any copy, including printout of the information. In no event shall this material be read, used, copied, reproduced, stored or retained by anyone other than the named addressee(s), except with the express consent of the sender or the named addressee(s).

March 31, 2023

Ms. Cindy Mulkey
Deputy Director
Office of Siting Coordination
Department of Environmental Protection
2600 Blair Stone Road, MS 5500
Tallahassee, FL 32399-2400

Re: **Okeechobee Plant – PPSA No. PA15-58**
Post-Certification Amendment
Okeechobee Potable Water Treatment System

Dear Ms. Mulkey:

Florida Power & Light Company (FPL) is requesting a post-certification amendment to the Site Certification for FPL's Okeechobee Clean Energy Center (OCEC), pursuant to rule 62-17.205(1)(A) F.A.C. The purpose of this amendment request is to obtain approval to construct new potable water treatment plant components at OCEC.

The new proposed design will utilize new treatment technologies including catalytic manganese dioxide filtration media for iron removal as pretreatment to NF membranes, followed by UV oxidation and disinfection using sodium hypochlorite to achieve the potable water quality required by FAC Rule 62-550. The only components of the existing plant to remain will be the surficial Floridan aquifer supply well, well pump, and the distribution piping to the OCEC facility; all other treatment plant components will be decommissioned and removed upon approval of the new plant. Given the proposed new treatment technologies, the water treatment plant will be reclassified as a Category II, Class C facility per FAC 62-699.310.

All proposed improvements will be constructed on previously developed impervious upland areas of OCEC. There are no proposed impacts to the existing stormwater system, runoff from the proposed improvements will drain via overland flow to existing drainage infrastructure within the North Pond and South Pond drainage areas. Piping and drainage structures will not be installed as part of the planned improvements. No wetlands or species impacts are anticipated.

Thank you for your attention to and consideration of FPL's request to amend the Site Certification for the OCEC. If you have any questions regarding this submittal, please do not hesitate to contact me at 561-691-7068 or Kennard.proctorjr@fpl.com.

Sincerely,
FLORIDA POWER & LIGHT COMPANY



Ken Proctor
Sr. Project Manager

Attachments:

A- Application for a specific permit to construct PWS components
B - Preliminary Design Report for the proposed changes

APPLICATION FOR A SPECIFIC PERMIT TO CONSTRUCT PWS COMPONENTS

See page 4 for instructions.

I. General Project Information

A . Name of Project: OCEC Potable Water Replacement Project

B . Description of Project and Its Purpose: The purpose of this project is to design and install a completely new potable water treatment plant at the OCEC that will replace the existing plant. The only components of the existing plant to remain will be the existing water supply well, well pump, and the distribution piping to the OCEC facility; all current treatment plant components will be decommissioned and removed upon permitting and approval of the new plant components. The groundwater quality from the existing water supply well used as the source for the WTP is high in TOC. The existing system uses a series of Filox (manganese dioxide) media filters to remove iron, followed by sodium hypochlorite injection for disinfection to maintain a minimum 0.2 mg/L free chlorine residual in the distribution system. The use of chlorine for disinfection with high TOC levels in the water can produce DBPs at levels that exceed the MCLs established by the USEPA. In addition to DBPs, the high iron can produce taste and aesthetics issues. FPL has elected to continue using the existing groundwater supply well and construct an entirely new water treatment plant to fully replace the existing plant to address the potential issues with DBPs.

C. Does project create a "new system" as described under subsection 62-555.525(1), F.A.C.? ☐ Yes, and a completed copy of Form 62-555.900(20), New Water System Capacity Development Financial and Managerial Operations Plan, is attached. ☒ No.

D. Location of Project

1. County Where Project Located: Okeechobee County
2. Description of Project Location: The OCEC facility is located at 100 FPL Landing, Okeechobee, FL 34972

3. Latitude and Longitude of Each New Treatment Plant and Each New Raw Water Source (attach additional sheets if necessary):

Name of New Treatment Plant or Raw Water Source	Latitude	Longitude
OCEC Potable Water Treatment System	27 º 38 ' 35.64 "N	80 º 47 ' 29.11 "W
	º ' "N	º ' "W
	º ' "N	º ' "W
	º ' "N	º ' "W
	º ' "N	º ' "W

E. Estimate of Cost to Construct Project: $1,240,000

F. Estimate of Dates for Starting and Completing Construction of Project:

G. Applicant

PWS/Company Name: Florida Power & Light Company		PWS Identification No.:*
PWS Type:* ☐ Community ☒ Non-Transient Non-Community ☐ Transient Non-Community ☐ Consecutive		
Contact Person: Russell Peters	Contact Person's Title: PGD Regional Plant General Manager	
Contact Person's Mailing Address: 21505 SR 60		
City: Vero Beach	State: FL	Zip Code: 32966
Contact Person's Telephone Number: 772-597-7371	Contact Person's Fax Number:	
Contact Person's E-Mail Address: russell.peters@fpl.com		

** This information is required only if the applicant is a public water system (PWS).*

H. Public Water System (PWS) Supplying Water to Project

PWS Name: Same as above		PWS Identification No.:
PWS Type: ☐ Community ☒ Non-Transient Non-Community ☐ Transient Non-Community ☐ Consecutive		
PWS Owner:		
Contact Person:	Contact Person's Title:	
Contact Person's Mailing Address:		
City:	State:	Zip Code:
Contact Person's Telephone Number:	Contact Person's Fax Number:	
Contact Person's E-Mail Address:		

APPLICATION FOR A SPECIFIC PERMIT TO CONSTRUCT PWS COMPONENTS

Project Name: OCEC Potable Water Replacement Project	Applicant: Florida Power & Light Company

I. Public Water System (PWS) that Will Own Project After It Is Placed into Permanent Operation

PWS Name:		PWS Identification No.:*
PWS Type:* ☐ Community ☒ Non-Transient Non-Community ☐ Transient Non-Community ☐ Consecutive		
PWS Owner: Florida Power & Light Company		
Contact Person: Russell Peters	Contact Person's Title: PGD Regional Plant General Manager	
Contact Person's Mailing Address: 21505 SR 60		
City: Vero Beach	State: FL	Zip Code: 32966
Contact Person's Telephone Number: 772-597-7371	Contact Person's Fax Number:	
Contact Person's E-Mail Address: Russell.Peters@fpl.com		

* *This information is required only if the owner/operator is an existing PWS.*

J. Professional Engineer(s) or Other Person(s) in Responsible Charge of Designing Project*

Company Name: Enercon Services, Inc.		
Designer(s): Steven G. Bond, P.E.	Title(s) of Designer(s): Senior Environmental Engingeer	
Qualifications of Designer(s): ☒ Professional Engineer(s) Licensed in Florida – License Number(s): 46046 ☐ Public Officer(s) Employed by State, County, Municipal, or Other Governmental Unit of State† ☐ Plumbing Contractor(s) Licensed in Florida – License Number(s):^		
Mailing Address of Designer(s): 12470 Telecom Drive, Suite 401		
City: Tampa	State: FL	Zip Code: 33637
Telephone Number of Designer(s): (813) 962-1800	Fax Number of Designer(s):	
E-Mail Address(es) of Designer(s): sbond@enercon.com		

* *Except as noted in paragraphs 62-555.520(3)(a) and (b), F.A.C., projects shall be designed under the responsible charge of one or more professional engineers licensed in Florida.*

† *Attach a detailed construction cost estimate showing that the cost to construct this project is $10,000 or less.*

^ *Attach documentation showing that this project will be installed by the plumbing contractor(s) designing this project, documentation showing that this project involves a public water system serving a single property and fewer than 250 fixture units, and a detailed construction cost estimate showing that the cost to construct this project is $50,000 or less.*

II. Certifications

A. Certification by Applicant

I am duly authorized to sign this application on behalf of the applicant identified in Part I.G of this application. I certify that, to the best of my knowledge and belief, this project complies with Chapter 62-555, F.A.C., and provides assurance of compliance with Chapter 62-550, F.A.C. I also certify that construction of this project has <u>not</u> begun yet.

Signature and Date	Russell Peters Printed or Typed Name	PGD Regional Plant General Manager Title

B. Certification by PWS Supplying Water to Project

I am duly authorized to sign this application on behalf of the PWS identified in Part I.H of this application. I certify that said PWS will supply the water necessary to meet the design water demands for this project. I certify that, to the best of my knowledge and belief, said PWS's connection to this project will <u>not</u> cause said PWS to be, or contribute to said PWS being, in noncompliance with Chapter 62-550 or 62-555, F.A.C. I also certify that said PWS has reviewed the preliminary design report or drawings, specifications, and design data for this project and that said PWS considers the connection(s) between this project and said PWS acceptable as designed.

- Name(s) of Water Treatment Plant(s) to Which this Project Will Be Connected: OCEC Potable Water System
- Total Permitted Maximum Day Operating Capacity of Plant(s), gpd: 83,420 gpd
- Total Maximum Day Flow at Plant(s) as Recorded on Monthly Operating Reports During Past 12 Months, gpd: 55,000 gpd

Signature and Date	Russell Peters Printed or Typed Name	PGD Regional Plant General Manager Title

Project Name:	Applicant:

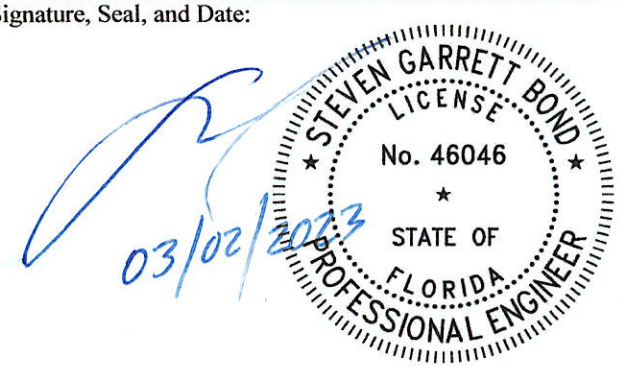
C. Certification by PWS that Will Own Project After It Is Placed into Permanent Operation

I am duly authorized to sign this application on behalf of the PWS identified in Part I.I of this application. I certify that said PWS will own this project after it is placed into permanent operation. I also certify that said PWS has reviewed the preliminary design report or drawings, specifications, and design data for this project and that said PWS considers this project acceptable as designed.

	Russell Peters	PGD Regional Plant General Manager
Signature and Date	Printed or Typed Name	Title

D. Certification by Professional Engineer(s) in Responsible Charge of Designing Project*

I, the undersigned professional engineer licensed in Florida, am in responsible charge of preparing the preliminary design report or drawings, specifications, and design data for this project. I certify that, to the best of my knowledge and belief, the design of this project complies with Chapter 62-555, F.A.C., and provides assurance of compliance with Chapter 62-550, F.A.C.

Signature, Seal, and Date:	Signature, Seal, and Date:
	
Printed/Typed Name: Steven G. Bond	Printed/Typed Name:
License Number: 46046	License Number:
Portion of Engineering Document(s) for Which Responsible:	Portion of Engineering Document(s) for Which Responsible:

Signature, Seal, and Date:	Signature, Seal, and Date:
Printed/Typed Name:	Printed/Typed Name:
License Number:	License Number:
Portion of Engineering Document(s) for Which Responsible:	Portion of Engineering Document(s) for Which Responsible:

* *Except as noted in paragraphs 62-555.520(3)(a) and (b), F.A.C., projects shall be designed under the responsible charge of one or more professional engineers (PEs) licensed in Florida. If this project is being designed under the responsible charge of one or more PEs licensed in Florida, Part II.D of this application shall be completed by the PE(s) in responsible charge. If this project is <u>not</u> being designed under the responsible charge of one or more PEs licensed in Florida, Part II.D does <u>not</u> have to be completed.*

APPLICATION FOR A SPECIFIC PERMIT TO CONSTRUCT PWS COMPONENTS

INSTRUCTIONS: This application shall be completed and submitted by persons proposing to construct or alter public water system components unless such proposed construction or alteration is permitted under the Department of Environmental Protection's (DEP's) "General Permit for Construction of Water Main Extensions for Public Water Systems," in which case Form 62-555.900(7) is to be completed and submitted, or under the DEP's "General Permit for Construction of Lead or Copper Corrosion Control, or Iron or Manganese Sequestration, Treatment Facilities for Small or Medium Public Water Systems," in which case Form 62-555.900(18) is to be completed and submitted. Complete and submit one copy of this application to the appropriate DEP District Office or Approved County Health Department (ACHD) along with payment of the proper application processing fee and one copy of the following information:

- either a preliminary design report or drawings, specifications, and design data (the preliminary design report or drawings, specifications, and design data shall contain all pertinent information required under subsection 62-555.520(4), F.A.C.); and
- the Florida Public Service Commission (FPSC) certificate of authorization to provide water service if the project involves construction of a new public water system subject to the jurisdiction of the FPSC.

All information provided on this application shall be typed or printed in ink. Application processing fees are listed in paragraph 62-4.050(4)(n), F.A.C. Checks for application processing fees shall be made payable to the Department of Environmental Protection or to the appropriate ACHD. Preliminary design reports, drawings, specifications, and design data prepared under the responsible charge of one or more professional engineers licensed in Florida shall be signed, sealed, and dated by the professional engineer(s) in responsible charge. NOTE THAT A SEPARATE APPLICATION AND A SEPARATE APPLICATION PROCESSING FEE ARE REQUIRED FOR EACH NON-CONTIGUOUS PROJECT.*

** Non-contiguous projects are projects that are neither interconnected nor located nearby one another (i.e., on the same site, on adjacent streets, or in the same neighborhood).*

Okeechobee Clean Energy Center

OCEC Potable Water Replacement Project

Preliminary Design Report

Issued for Permitting

March 2023

Prepared by

ENERCON
12470 Telecom Drive, Suite 401
Tampa, FL 33637

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Appendix A - FDEP Permit, PWS ID No. 4474515

Appendix B – Supply Well Water Quality

Appendix C – Historical Water Usage

Appendix D – Chemical Safety Data Sheets

Appendix E – NF Membrane Modeling Results

Appendix F – Equipment Cut Sheets

- Chemical Dosing Systems
- Duplex Filter Skid
- Nanofiltration Skid
- UV Oxidation Lamp
- High Service and Backwash Pumps
- Hydropneumatic Tank
- Hydropneumatic Pressure Control System

Abbreviations

Acrylonitrile Butadiene Styrene - ABS

America National Standards Institute - ANSI

American Society for Testing and Materials – ASTM

American Society of Mechanical Engineers - ASME

Association for the Advancement of Cost Engineering - AACE

Average Daily Flow – ADF

Clean in Place – CIP

Cubic Feet per Minute – CFM

Distributed Control System - DCS

Disinfection Byproducts - DBPs

Fiberglass Reinforced Plastic - FRP

Florida Power& Light - FPL

Florida Administrative Code - FAC

Florida Statutes – FS

gallons per day – gpd

gallons per minute – gpm

gallons per minute per square foot – gpm/sf

Hertz – Hz

Horsepower – Hp

Human-Machine Interface - HMI

Maximum Daily Flow - MDF

Maximum Contaminant Levels – MCLs

milligrams per liter - mg/L

Monthly Operating Reports - MOR

Nanofiltration – NF

nanometers – nm

National Sanitation Foundation - NSF

Okeechobee Clean Energy Center – OCEC

parts per billion - ppb

Phase – PH

Point of Entry - POE

Programable Logic Controller - PLC

Process Flow Diagram - PFD

Piping and Instrumentation Diagram - P&ID

pounds per square inch absolute - psia

pounds per square inch gage – psig

pounds per square inch - psi

Polyvinyl Chloride – PVC

Polytetrafluoroethylene - PTFE

Public Water System Identification Number - PWS ID No

Reverse Osmosis – RO

revolutions per minute - rpm

Safety Data Sheets – SDSs

Supervisory Control and Data Acquisition - SCADA

Silt Density Index - SDI

State Road – SR

Stainless Steel - SS

Thin Film Composite – TFC

Total Dynamic Head - TDH

Total Organic Carbon - TOC

Ultraviolet - UV

United States Environmental Protection Agency – USEPA

Volts Alternating Current – VAC

Variable Frequency Drive - VFD

Water Treatment Plant – WTP

Engineering Certification

This Preliminary Engineering Report has been prepared by a Florida licensed professional engineer in general compliance with Chapters 62-550 and 62-555.520 FAC for the permit application to construct or alter a public water system component(s); as required by the permit application, DEP Form 62-555.900(1), either a preliminary engineering report or drawings, specifications, and design data shall be submitted with the permit application containing the information required under subsection 62-555.520(4) FAC.

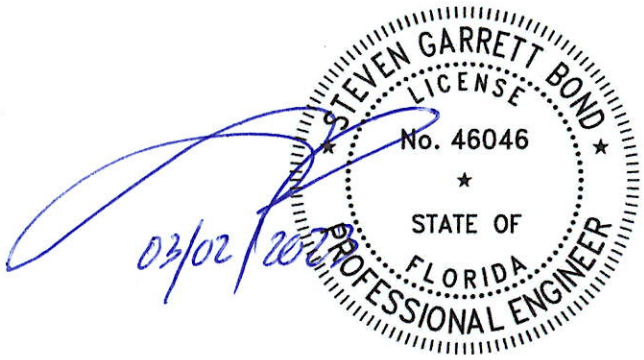
Submitted by,

ENERCON Services, Inc.

Steven G. Bond, P.E.

P.E. Number: 46046

Date: March 2, 2023



1.0 Project Overview and Purpose

FPL operates the OCEC located at 21505 SR 60 in Vero Beach, Florida. As part of the facility operations, FPL operates a non-transient non-community potable WTP permitted by the FDEP under the provisions of Chapter 403 FS, and FAC Chapters 62-4, 62-550, 62-555 and 62-560. The existing WTP is classified as a Category V, Class D WTP, and is permitted to operate at a maximum capacity of 83,420 gpd; the FDEP permit, PWS ID No. 4474515, is included in **Appendix A**.

The groundwater quality from the existing water supply well used as the source for the WTP is high in TOC and iron. The existing system uses a series of Filox (manganese dioxide) media filters to remove iron, followed by sodium hypochlorite injection for disinfection to maintain a minimum 0.2 mg/L free chlorine residual in the distribution system. The use of chlorine for disinfection with high TOC levels in the water can produce DBPs at levels that exceed the MCLs established by the USEPA. In addition to DBPs, the high iron can produce taste and aesthetics issues. FPL has elected to continue using the existing groundwater supply well and construct an entirely new WTP to fully replace the existing plant to address the potential issues with DBPs.

The new WTP will utilize new treatment technologies including catalytic manganese dioxide filtration media for iron removal as pretreatment to NF membranes, followed by UV oxidation and disinfection using sodium hypochlorite to achieve the potable water quality required by FAC Rule 62-550. TOC levels will be reduced to level below 1.0 mg/L which will ensure DBPs levels remain below specified MCLs. Given the proposed new treatment technologies, the WTP will be reclassified as a Category II, Class C facility per FAC 62-699.310.

2.0 Supply Well Water Quality

Appendix B provides the most recent analytical results from September 2022 from the WTP supply well as well as previous analytical results from sampling events in 2020. The results for TOC, iron and hydrogen sulfide are summarized below in **Table 2.1**. The treatment processes selected to address the high levels of TOC and iron are described below in Section 5.0.

Table 2.1 Water Quality Results

Sample Date	Location	TOC (mg/L)	Iron (mg/L)	Hydrogen Sulfide (mg/L)
09/2020	POE	7.7	--	--
09/2020	Well	7.2	--	--
09/2020	Sink	--	--	0.013
11/2020	POE	--	0.4	0.013
11/2020	Well	--	1.30	0.11
09/2022	Well	9.64	1.12	0.3

3.0 System Potable Water Usage

Appendix C provides MORs from November 2021 through October 2022; the tabulated ADF and MDF for water usage at the OCEC is summarized below in **Table 3.1**. The WTP does not provide firewater supply to the OCEC facility.

Table 3.1 Historical Water Usage

Month-Year	ADF	MDF	Comments
Nov-21	3,318	4,500	
Dec-21	3,507	4,500	
Jan-22	4,268	5,500	
Feb-22	7,804	55,000	Turnaround event in this month
Mar-22	12,586	45,000	Turnaround event in this month
Apr-22	4,007	8,500	
May-22	3,877	7,000	
Jun-22	3,633	4,500	
Aug-22	3,868	5,000	
Sep-22	4,110	8,300	
Oct-22	3,983	5,000	
Nov-22	4,158	5,500	
ADF previous 12 Months	**4,927**		
MDF previous 12 Months		**55,000**	

The OCEC facility conducts facility turnarounds for maintenance several times a year which produces elevated water usage during those periods. The MDF indicated above is reflective of the turnaround event; The MDF excluding the turnaround events would be 8,500 gpd.

The current WTP is permitted to operate at a maximum capacity of 83,420 gpd; the new facility will be designed to maintain the same maximum capacity of 83,420 gpd which will provide for current facility usage as well as potential future facility expansions.

4.0 Existing WTP Modifications

The proposed new WTP will replace the existing WTP in its entirety; the new WTP will be constructed adjacent to the existing plant to allow a transfer of the supply water from the existing groundwater supply well to the new plant. Prior to completion of the new WTP, a connection with a shutoff valve and check valve will be installed on the discharge from the existing well to allow connection of the new WTP while maintaining operation of the existing WTP. Similarly, at the discharge from the existing WTP to the system distribution piping a connection with a shutoff valve will be installed to allow connection of the new WTP discharge to the system distribution piping. The distribution piping to the OCEC facility will remain unchanged and be used with the new WTP.

The existing supply well has the capacity to supply both the existing and new WTP simultaneously, so the new connection to the supply well discharge will allow the new WTP to be started up and tested while maintaining operation of the existing WTP without cross contamination. During startup and testing, the discharge from the new WTP will be piped to the existing wastewater sump for disposal in the onsite deep injection well.

Appendix A provides the current FDEP permit for the existing WTP in which a description of all existing equipment is provided. All the equipment listed in the permit except for the well pump will be decommissioned and removed after the construction and acceptance of the new WTP.

5.0 New Water Treatment Plant Process Description

Figure 5.1 provides a PFD with a material balance for the proposed new WTP; **Figure 5.2** provides the P&IDs for the proposed new WTP. The treatment technologies were selected to reduce the high levels of TOC and iron. NF was selected as the primary process to remove TOC followed by UV oxidation to destroy any remaining TOC after the NF membranes. The entire process will be automatically controlled by local PLCs and be monitored by the plant SCADA.

Based on the supply well water quality having high turbidity, an SDI test was conducted at the site to determine the potential for fouling of the NF membranes. The SDI tests produced results of 1.2 and 1.5 which indicate a low potential for fouling. Based on these results, catalytic manganese oxide media filters were selected to reduce the iron concentrations and provide prefiltration prior to the NF membranes.

5.1 Existing Supply Well Pump

The existing well pump is rated at 110 gpm at 170 TDH. Flow from the existing well pump will be automatically regulated by the NF skid demand. The NF skid will be provided with a VFD controlled pump, the speed of the pump will be adjusted to regulate the flow through the membranes which will place backpressure on the well pump and throttle the pump output to match the flow demand of the NF membranes. The existing well pump is adequately sized to provide the feed flowrate of 80 gpm and pressure to the NF membranes.

5.2 Manganese Oxide Filters and Backwash Pumps

Manganese oxide filter media is a silica sand core chemically coated with manganese oxide that promotes oxidation and precipitation of iron (and manganese), and then filters the precipitated iron within the media. The media is then periodically backwashed to remove the precipitated iron. The media requires a chlorine feed prior to the filters to initiate the oxidation process and maintain the oxidizing efficiency of the media.

The filter skid will be supplied with two vertical filter pressure vessels which will be operated in parallel. Both vessels will be sized for 100% of the design flow required by the NF membranes to produce the permitted flow of 83,420 gpd or approximately 60 gpm. To produce a permeate flow of 60 gpm, the filter vessels will have to be sized to process a flowrate of 80 gpm based on a projected recovery rate of 75% and a reject rate of 25% from the NF membranes. The filter skid will be supplied with its own PLC to control operation of the filter vessels including the backwash and rinse sequences. Summarized below are the proposed loading rates for the filter sizing based on the requirements established by the manufacturer of the manganese oxide filter media.

Filter Loading Rate =	2 – 12 gpm/sf
Filter Flowrate (per vessel) =	80 gpm
Backwash Loading Rate =	12 – 16 gpm/sf
Backwash Flowrate =	200 gpm
Filter Vessel Diameter =	4’ diameter
Media Depth =	30”

Two backwash pumps providing 100% redundancy will be provided for backwashing the filters. The backwash pumps will be controlled by the filter system PLC. The backwash loading rate and pump flowrate are summarized above. Backwash from the filters will be routed to the existing system wastewater sump and ultimately disposed in the site deep injection well.

5.3 Chemical Dosing Systems

There are five chemical dosing systems proposed for the new WTP as summarized below in **Table 5.1**. All the chemical dosing systems will be flow paced; two new propeller type flowmeters with transmitters will be installed, one at the discharge of the existing well pump and one after the high service pumps.

Table 5.1 Chemical Dosing Systems

System No.	Description	Location
1	Sodium Hypochlorite; maintain free chlorine residual of approximately 0.3 mg/L into iron removal filters	Prior to manganese oxide filters
2	Sodium Bisulfite; dosed at approximately 1.5 mg/L per 1 mg/L free chlorine residual	After manganese oxide Filter
3	Antiscalant; dosing rate established by NF skid supplier	After injection point for Sodium Bisulfite and prior to NF Membranes
4	Sodium Hypochlorite; raise free chlorine residual to 3 - 4 mg/L entering ground storage tank	After UV Oxidation system and prior to 7,500-gallon Ground Storage Tank
5	Sodium Hypochlorite; maintain free chlorine residual at approximately 3.5 mg/L into the distribution system	After High Service Pumps and Hydropneumatic Tank

SDSs are included in **Appendix D** for the proposed chemicals to be used in the WTP.

5.4 Nanofiltration Skid

NF membranes have a pore size around 0.001 micron or 1 nm. NF removes most organic molecules, nearly all viruses, most of the natural organic matter and a range of salts. NF removes divalent ions such as calcium and magnesium, which make water hard, so NF is often used to soften hard water. As a result of having larger pore sizes, the feed pressure required by the NF system is lower compared to RO systems. TOC levels are anticipated to be reduced by ≥90% through the NF membranes.

The NF skid will be sized to produce 60 gpm product flow with 75% recovery. The membranes will be provided in a multi-stage, single pass configuration. The skid will be supplied with the following major components:

- Cartridge filter; 1 micron nominal
- Vertical centrifugal feed pump
- VFD pump drives
- FRP pressure vessels
- Spiral wound TFC membranes
- PVC Low pressure feed and reject piping
- Stainless steel high-pressure piping
- Integrated CIP skid
- PVC product piping
- PLC with a touchscreen HMI interface.

Reject from the NF membranes will be routed to the existing system wastewater sump and ultimately disposed in the site deep injection disposal well. Modeling results for the NF membranes is provided in **Appendix E**. The PFD, **Figure 5.1,** shows a simplified material balance for the constituents of concern, a detailed mass balances of all ionic species and scaling parameters for the membranes is provided in the NF membrane model results in **Appendix E**.

The NF skid will be provided with a CIP skid for onsite cleaning of the NF membranes. The CIP skid will include a tank, pump, and heater. Cleaning is carried out at low pressures to minimize permeate production and redeposition of dirt on the membrane element. Permeate production is limited in order to achieve high crossflow velocities across the membrane surface; high crossflow velocities ensure effective removal of foulants from the membrane surface.

5.5 UV Oxidation System

The UV oxidation will be used to reduce TOC levels after the NF membranes to low ppb levels. A UV lamp with a wavelength of 185 nm will be used; the vacuum UV light energy promotes the formation of OH- radicals from the photolysis of water. The OH-radicals react with the organic matter in the water leading to the oxidation into carbon dioxide and water, resulting in the removal of TOC. Three UV lamps connected in parallel, each rated at 20 gpm, will be used to further reduce TOC levels after the NF skid.

5.6 Ground Storge Tank

A 7,500-gallon ground storage tank will be supplied to provide approximately one day storage at the MDF. The tank will be constructed of FRP and will comply with NSF/ANSI 61 Standards. The tank will be fitted with a level transmitter which will control both the high service pumps and the NF skid. The level transmitter will deenergize the high service pumps on low tank level set point and will energize and deenergize the NF skid operation on different low level and high-level set points.

5.7 High Service Pumps and Ground Storage Tank

Two high service pumps will be supplied. Each pump will be sized to provide 60 gpm at 215 TDH. The discharge head is based on the pressure required to refill the hydropneumatic tank once the drawdown in the tank has been reached. The pumps will be controlled by the hydropneumatic tank pressure control system and will energize on low and low-low pressure set points in the hydropneumatic tank as described below. Once the hydropneumatic tank has reached the high pressure set point or low-level set point in the ground storage tank, the high service pumps will be deenergized.

5.8 Hydropneumatic Tank

The hydropneumatic tank has been sized to provide a drawdown of 900 gallons at a minimum pressure of 57 psia which is sufficient to supply flow to three safety showers operating at the same time. Each shower requires 20 gpm at a pressure of 30 psi (at the shower location) for a duration of 15 minutes. Additionally, the proposed drawdown will prevent the high service pumps from cycling on and off. The hydropneumatic tank will be provided with a pressure control system to turn on the high service pumps on low pressure and shutoff the pumps on high pressure and/or high-water level in the tank. The tank will be designed to operate at 50% air volume above the water level. This air volume helps minimize the overall size of the tank with the proposed 900-gallon drawdown requirement.

Based on the required 900-gallon drawdown, the hydropneumatic tank will have a volume of approximately 3,000 gallons and be supplied as a horizontal tank. The tank internal surface with be coated with an NSF/ANSI 61 compliant epoxy coating.

5.9 Hydropneumatic Tank Pressure Control System

The hydropneumatic tank will be supplied with an air control system which includes an air compressor and instrumentation to maintain the pressure in the tank and energize / deenergize the high service pumps. The hydropneumatic tank pressure control system will be provided with the following equipment and instrumentation:

- Control Panel
- Pressure Transmitter
- Level Transmitter
- Air Compressor

After drawdown of 900 gallons, the pressure inside the tank will reach the first low pressure set point (57 psia). At this first low-pressure set point the pressure transmitter will energize one high service pump to start refilling the tank to reach the high pressure set point of 92 psia. Should the system demand be higher than 60 gpm, and the pressure in the hydropneumatic tanks falls below the first low pressure to the second low pressure set point (55 psia), then the second high service pump will be energized. Once the pressure in the tank rises above the first low pressure set point the second high service pump will drop out and the first high service pump will continue to fill the tank to the high pressure set point.

At the high pressure set point, some air will dissolve into the water which will reduce the pressure within the hydropneumatic tank and cause the water level in the tank to rise. The level transmitter will sense the rise in water level and the pressure transmitter will sense a drop in pressure which will energize the air compressor to start pumping air back into the tank. A time-delay in the level transmitter will prevent rapid cycling of the air compressor due to potential waves in the tank.

6.0 New Water Treatment Plant Equipment

Summarized below in **Table 6.1** are the new proposed equipment descriptions for the new WTP. Cut sheets for the proposed equipment are included in **Appendix F**. All equipment wetted materials of construction comply with NSF/ANSI 61 Standards.

Table 6.1 – New System Equipment List

Equipment Description	Qty	Manufacturer / Model No. [1]	Capacity / Size	Material of Construction	Electrical
Existing Well Pump	1	Goulds Model 85GS75	110 gpm at 170 TDH; 4" diameter well	Pump wetted parts 304 SS	7.5 HP, 460 VAC, 3 PH, 60 Hz, 3450 RPM
Sodium Hypochlorite Dosing System (duplex pumps)	3	Flomotion Systems	0.004 to 48.5 GPH; 100 psi	PVC connectors / Santoprene tubing / Stainless Steel / ABS plastic pumphead.	220-240 VAC, 1 PH, 60 HZ
Multimedia Filter Housings	2	Suez, Pro-M48	80 gpm filtered flow; 4' diameter vessels; 6.5 gpm/sf loading rate; 200 gpm backwash rate at 16 gpm/sf loading rate	ASME tank, carbon steel; interior epoxy coating	460 VAC, 3 PH, 60 HZ
Sodium Bisulfite Dosing System (duplex pumps)	1	Flomotion Systems	0.004 to 48.5 GPH; 100 psi	PVC connectors / Santoprene tubing / Stainless Steel / ABS plastic pumphead.	220-240 VAC, 1 PH, 60 HZ
Antiscalant Dosing System (duplex pumps)	1	Flomotion Systems	0.004 to 48.5 GPH; 100 psi	PVC connectors / Santoprene tubing / Stainless Steel / ABS plastic pumphead.	220-240 VAC, 1 PH, 60 HZ
Nanofiltration Skid	1	Suez; RO-PROflex,18-2	60 gpm product flow, 8" pressure vessels; multi-stage, single pass; 30-60 psi inlet pressure, 75% recovery	Sch 80 PVC / 316L SS piping; Polyamide TFC membranes; FRP/316L SS/ABS pressure vessel wetted parts	25 Hp, 460 VAC, 3 PH, 60 HZ
CIP Skid	1	Suez; Proflex 18/24	135 gpm @ 111 TDH	Sch 80 PVC piping, HDPE tank; 316 SS pump	7.5 Hp, 460 VAC, 3 PH, 60 HZ
UV Oxidation Lamp	3	Neotech T238; TOC Reduction	20 gpm, 185 nm UV	316L SS	110-240V, 50/60Hz
Ground Storage Tank	1		7,500-gallon;	FRP	N/A
High Service Pumps	2	ITT Goulds; Model 3196, 1 x 1$_{1/2}$-8	60 gpm; 215 TDH;	Carbon steel; epoxy lined	7.5 HP, 460 VAC, 3 PH, 60 HZ
Hydropneumatic Tank	1	Pulsco	3,000-gallon, horizontal, 900-gallon drawdown; ASME 150 psi rated	Carbon steel; interior epoxy coating	220-240 VAC, 1 PH, 60 HZ
Hydropneumatic Tank Pressure Control System	1	Pulsco	17 CFM compressor, 80-gallon receiver, 200 psi, cut in 150 psi, cut out 175 psi	Receiver carbon steel, interior epoxy coating, Control Panel NEMA 4X	5 HP, 460 VAC, 3 PH, 60 HZ
Backwash Pumps	2	ITT Goulds; Model 3196 1$_{1/2}$ x 3-6	200 gpm, 90 TDH	Carbon steel; epoxy lined	7.5 HP, 460 VAC, 3 PH, 60 HZ

Note: Manufacturer / Model numbers are basis for equipment design and specification; actual manufacturer and model numbers will be dependent on contractor selected for construction of the WTP.

7.0 Estimated Plant Construction Costs

The cost to construct the new WTP is estimated at $1,244,250; **Table 7.1** below provides the cost estimate (Class 4 estimate based on the AACE International Recommended Practice No. 18R-97) for the construction of the new WTP. The expected accuracy range for a Class 4 estimate is summarized below.

Expected Accuracy Range – Typical variation in low and high ranges at 80% confidence interval	
Low:	-15% to - 30%
High:	+20% to + 50%

Table 7.1 Estimated WTP Construction Costs (Class 4 Estimate)

Item No.	Description	Unit of Measure	Quantity	Unit Price	Extented Price
Construction					
1	Multimedia Filter Housings (iron removal); 4' Diameter	each	2	$ 51,460	$ 102,920
2	Manganese Oxide (Green Sand) Media	ft^3	60	$ 144	$ 8,640
3	Backwash Pumps	each	2	$ 8,000	$ 16,000
4	Nanofiltration Skid	lump sum	1	$ 147,030	$ 147,030
5	Clean In Place Skid	lump sum	1	$ 42,060	$ 42,060
6	UV TOC Destruction Skid	lump sum	1	$ 94,350	$ 94,350
7	Ground Storage, 7,500 gallons	each	1	$ 25,000	$ 25,000
8	High Service Pumps	each	2	$ 9,500	$ 19,000
9	Hydropneumatic Tank, 3,000 gallons	lump sum	1	$ 60,000	$ 60,000
10	Hydropneumatic Tank Pressure Control System	lump sum	1	$ 20,000	$ 20,000
11	Chemical Delivery Skids, duplex pumps	each	5	$ 9,000	$ 45,000
12	Static Mixers	each	4	$ 2,000	$ 8,000
13	Concrete Foundation	lump sum	1	$ 65,000	$ 65,000
14	Pre-engineered Metal Cover	lump sum	1	$ 75,000	$ 75,000
15	Interconnecting Piping, Valves and Appurtenances	lump sum	1	$ 65,000	$ 65,000
16	Electrical Service	lump sum	1	$ 75,000	$ 75,000
17	Instrumentation and Controls	lump sum	1	$ 80,000	$ 80,000
	Construction Subtotal				**$ 948,000**
Engineering and Construction Management					
18	Engineering Design (15% Construction Costs)	lump sum	1	$ 142,200	$ 142,200
19	Construction Management (10% Construction Costs)	lump sum	1	$ 94,800	$ 94,800
	Engineering Design and Construction Management Subtotal				**$ 237,000**
	Contingenty (25% of Total Costs)				**$ 296,250**
				Total Project Estimated Cost	**$ 1,244,250**

FIGURES

NOTES.
1. FOR MATERIAL BALANCE SHEET SEE DRAWING FPL00064-P10-002.

FIGURE 5.1

TECHNICAL ACCEPTANCE — ENGINEERING ORGANIZATION — ORG — BY — DATE
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SODIUM HYPOCHLORITE PUMPS
SODIUM HYPOCHLORITE
SODIUM BISULFITE PUMPS
SODIUM BISULFITE
ANTISCALANT PUMPS
ANTISCALANT
AIR COMPRESSOR
HYDROPNEUMATIC TANK (3,000 GALLON)
SODIUM HYPOCHLORITE PUMPS
SODIUM HYPOCHLORITE
SODIUM HYPOCHLORITE PUMPS
SODIUM HYPOCHLORITE
TO INJECTION WELL DISPOSAL
FE
STATIC MIXER
SURFICIAL WELL #1
DMI FILTER
DMI FILTER
STATIC MIXER
NANOFILTRATION
UV OXIDATION
STATIC MIXER
GROUND STORAGE TANK (7,500 GALLON)
BACKWASH PUMP
BACKWASH PUMP
HIGH SERVICE PUMP
HIGH SERVICE PUMP
STATIC MIXER
FE
TO DISTRIBUTION SYSTEM
VENDOR SKID

REV	DATE	REVISION DESCRIPTION	DMA BY	SGB CH	FL COR	KW APR	. ORG
A	XX/XX/22	ISSUED FOR APPROVAL					

FOR APPROVAL

SR 514994

ENERCON
12470 TELECOM DRIVE, SUITE 401
TEMPLE TERRACE, FLORIDA 33637
FLORIDA CERTIFICATE OF REGISTRATION NO. P16327

FPL

SYSTEM: UNIT 1	DISCIPLINE: M	PLANT/UNIT: OKEECHOBEE CLEAN ENERGY CENTER	BAR CODE
SCALE: NONE	CAD FILE NAME: FPL00064-P10-001	TITLE: POTABLE WATER SUPPLY PROCESS FLOW DIAGRAM	
DRAWING SIZE: D(22"x34")	FPL ARCHIVE NAME: FPL00064-P10-001		
DRAWING NUMBER: FPL00064-P10-001		SHEET: 1 of 2	REV: A

FPGBDR-D 5/09

NOTES.
1. FOR PFD SEE DRAWING FPL00064-P10-001.

Parameter	Units	Process Stream 1	2 Chem Feed	3	4 Chem Feed	5 Chem Feed	6 Filter Backwash Intermittent	7 Reject	8 Product	9	10 Chem Feed	11	12 Backwash Feed Intermittent	13	14 Chem Feed	15 Flush to Drain Intermittent
Flow	gpm	80	-	80	-	-	200	20	60	60	-	60	200	60	-	60
Pressure	psi	63	-	60	-	-	30	55	10	10	-	10	39	93	-	10
Temperature	°F	60	-	60	-	-	60	60	60	60	-	60	60	60	-	60
pH	-	7.72	-	7.72	-	-	7.72	8.11	7.05	7.05	-	7.05	7.05	7.05	-	7.05
Conductivity	uS/cm	553	-	553	-	-	553	2,373	118	118	-	118	118	118	-	118
Total Suspended Solids	mg/L	1.30	-	0.13	-	-	44	0.13	-	-	-	-	-	-	-	-
Total Dissolved Solids (TDS)	mg/L	450	-	450	-	-	450	1,890	106	106	-	106	106	106	-	106
Free Chlorine (Cl_2, HOCl, OCl^-)	mg/L	0.30	-	-	-	-	3.50	-	-	-	-	3.50	3.50	3.50	-	-
Constituents of Concern																
Total Organic Carbon (TOC)	mg/L	9.6	-	9.6	-	-	-	8.64	≤ 0.96	≤ 0.01	-	≤ 0.01	≤ 0.01	≤ 0.01	-	≤ 0.96
Iron (Fe)	mg/L	1.12	-	0.05	-	-	1.07	0.18	0.01	0.01	-	0.01	0.01	0.01	-	0.01
Manganese (Mn)	mg/L	0.06	-	0.06	-	-	0.06	0.21	0.01	0.01	-	0.01	0.01	0.01	-	0.01
Hydrogen Sulfide (H_2S)	mg/L	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chemical Dose																
Sodium Hypochlorite (NaOCl), 12.5%	mg/L	-	3.50		-	-	-	-	-	-	3.50	-	-	-	1.00	-
Sodium Bisulfite ($NaHSO_3$), 40%	mg/L	-			0.45	-	-	-	-	-	-	-	-	-	-	-
Antiscalant (proprietary)	mg/L	-				4.68	-	-	-	-	-	-	-	-	-	-
Chemical Feed Rate							-	-	-	-	-	-	-	-	-	-
Sodium Hypochlorite (NaOCl), 12.5%	gph	-	0.10				-	-	-	-	0.10	-	-	-	0.023	-
Sodium Bisulfite ($NaHSO_3$), 40%	gph	-			0.004		-	-	-	-	-	-	-	-	-	-
Antiscalant (proprietary)	gph	-				0.02	-	-	-	-	-	-	-	-	-	-

TECHNICAL ACCEPTANCE — ENGINEERING ORGANIZATION — ORG — BY — DATE

WALKDOWN INFORMATION — AS-BUILT INFORMATION — ORG — BY — DATE

REV	DATE	REVISION DESCRIPTION	BY	CH	COR	APR	ORG
A	XX/XX/22	ISSUED FOR APPROVAL	DMA	SGB	FL	KW	.

SR 514994

FOR APPROVAL

ENERCON
12470 TELECOM DRIVE, SUITE 401
TEMPLE TERRACE, FLORIDA 33637
FLORIDA CERTIFICATE OF REGISTRATION NO. P16327

FPL

SYSTEM: UNIT 1	DISCIPLINE: M	PLANT/UNIT: OKEECHOBEE CLEAN ENERGY CENTER
SCALE: NONE	CAD FILE NAME: FPL00064-P10-002	TITLE: POTABLE WATER SUPPLY PROCESS FLOW DIAGRAM MATERIAL BALANCE SHEET
DRAWING SIZE: D(22"x34")	FPL ARCHIVE NAME: FPL00064-P10-002	
DRAWING NUMBER: FPL00064-P10-002	SHEET: 2 of 2	REV: A

BAR CODE

FRCBDR-D 5/09

TECHNICAL ACCEPTANCE | ENGINEERING ORGANIZATION | ORG | BY | DATE

WALKDOWN INFORMATION | AS-BUILT INFORMATION | ORG | BY | DATE

GENERAL ABREVIATIONS

AG	ABOVE GROUND	MTL	MATERIAL
ATM	ATMOSPHERE	MAX	MAXIMUM
BL	BATTERY LIMIT	MIN	MINIMUM
BTL	BOTTOM TANGENT LINE	MOV	MOTOR OPERATED VALVE
BYP	BYPASS	MW	MANWAY
CC	CHEMICAL CLEANOUT	NC	NORMALLY CLOSED
CL	CENTERLINE	NNF	NORMALLY NO FLOW
CO	CLEANOUT	NO	NORMALLY OPEN
CONN	CONNECTION	NOZ	NOZZLE
CSC	CAR SEAL CLOSED	O/C	OPEN/CLOSE
CSO	CAR SEAL OPEN	O/O	ON/OFF
CTR	CENTER	OP	OUTPUT
DCS	DISTRIBUTED CONTROL SYSTEM	OSBL	OUTSIDE BATTERY LIMITS
DES	DESIGN	OVHD	OVERHEAD
DIA	DIAMETER	PLC	PROGRAMMABLE LOGIC CONTROLLER
DP	DESIGN PRESSURE		
D/P	DIFFERENTIAL PRESSURE	PRESS	PRESSURE
DRN	DRAIN	PV	PROCESS VARIABLE
DT	DESIGN TEMPERATURE	(R)	RELOCATED
DWG	DRAWING	REQD	REQUIRED
(E)	EXISTING	RTD	RESISTANCE TEMPERATURE DETECTOR
EL	ELEVATION		
ESD	EMERGENCY SHUTDOWN	SC	SAMPLE CONNECTION
FOF	FACE OF FLANGE	SCH	SCHEDULE
(F)	FURNISHED	SD	SHUTDOWN
FC	FAIL CLOSED	SG	SPECIFIC GRAVITY
FI	FAIL INDETERMINATE	SIS	SAFETY INSTRUMENTED SYSTEM
FL	FAIL LOCKED (LAST POSITION)	SO	STEAM OUT
FLG	FLANGE	SP	SET POINT
FO	FAIL OPEN	SS	STAINLESS STEEL
FP	FULL PORT	S/S	START/STOP
FV	FULL VACUUM	STD	STANDARD
GO	GEAR OPERATED	T/C	THERMOCOUPLE
GR	GRADE	TDH	TOTAL DIFFERENTIAL HEAD
HC	HOSE CONNECTION	TEMP	TEMPERATURE
HDR	HEADER	THRD	THREADED
HH	HAND HOLE	TL	TANGENT LINE
HOA	HAND/OFF/AUTOMATIC	TSO	TIGHT SHUT-OFF
HP	HIGH PRESSURE	T/T	TANGENT TO TANGENT
HPT	HIGH POINT	TYP	TYPICAL
IAS	INSTRUMENT AIR SUPPLY	UG	UNDERGROUND
ISBL	INSIDE BATTERY LIMITS	VNT	VENT
LC	LOCKED CLOSED	VAC	VACUUM
LO	LOCKED OPEN	VB	VORTEX BREAKER
LP	LOW PRESSURE	W/	WITH
LPT	LOW POINT	W/O	WITHOUT

DGESPC 3,0

INSTRUMENT IDENTIFICATION LETTERS

	FIRST LETTER		SUCCEEDING LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		
B	BURNER, FLAME, COMBUSTION		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
C	USER'S CHOICE (TYPICALLY CONDUCTIVITY - ELECTRICAL)			CONTROL	CLOSED
D	USER'S CHOICE (TYPICALLY DENSITY OR SPECIFIC GRAVITY)	DIFFERENTIAL			DIVERT
E	VOLTAGE		SENSOR (PRIMARY ELEMENT)		
F	FLOW RATE	RATIO (FRACTION)			
G	USER'S CHOICE OR GAUGING (DIMENSIONAL)		GLASS, VIEWING DEVICE		
H	HAND				HIGH
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER	SCAN			
K	TIME, TIME SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT		LOW
M	USER'S CHOICE (TYPICALLY MOISTURE OR HUMIDITY)	MOMENTARY			MIDDLE, INTERMEDIATE
N	USER'S CHOICE		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
O	USER'S CHOICE		ORIFICE, RESTRICTION		OPEN
P	PRESSURE, VACUUM		POINT (TEST) CONNECTION		
Q	QUANTITY OR HEAT DUTY	INTEGRATE, TOTALIZE			
R	RADIATION		RECORD		
S	SPEED, FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	THROUGH
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION, MECHANICAL ANALYSIS			VALVE, DAMPER, LOUVER	
W	WEIGHT, FORCE		WELL		
X	UNCLASSIFIED	X AXIS	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED
Y	EVENT, STATE OR PRESENCE	Y AXIS		RELAY, COMPUTE, CONVERT	
Z	POSITION, DIMENSION	Z AXIS		DRIVER, ACTUATOR, UNCLASSIFIED FINAL CONTROL ELEMENT	

GENERAL INSTRUMENT SYMBOLS

LOCATION/ACCESSIBILITY	DISCRETE INSTRUMENTS	SHARED DISPLAY AND CONTROL (DCS)	PLC	DISCRETE HARDWARE INTERLOCK
FIELD MOUNTED 1. FIELD OR LOCALLY MOUNTED. 2. ACCESSIBLE TO AN OPERATOR AT DEVICE.	○	◯	◇	◇
PRIMARY LOCATION NORMALLY ACCESSIBLE TO AN OPERATOR 1. CENTRAL OR MAIN CONTROL ROOM. 2. FRONT OF MAIN PANEL OR CONSOLE MOUNTED. 3. VISIBLE ON VIDEO DISPLAY. 4. ACCESSIBLE TO AN OPERATOR AT DEVICE OR CONSOLE.	⊖	⊖	◇	
PRIMARY LOCATION NORMALLY INACCESSIBLE TO AN OPERATOR 1. CENTRAL OR MAIN CONTROL ROOM. 2. REAR OF PANEL OR CABINET MOUNTED. 3. NOT VISIBLE ON VIDEO DISPLAY. 4. NOT NORMALLY ACCESSIBLE TO AN OPERATOR AT DEVICE OR CONSOLE.	⊖	⊖	◇	
AUXILIARY LOCATION NORMALLY ACCESSIBLE TO AN OPERATOR 1. SECONDARY OR LOCAL CONTROL ROOM. 2. FIELD OR LOCAL CONTROL PANEL. 3. FRONT OF SECONDARY OR LOCAL PANEL MOUNTED. 4. VISIBLE ON VIDEO DISPLAY. 5. ACCESSIBLE TO AN OPERATOR AT DEVICE OR CONSOLE.	⊖	⊖	◇	
AUXILIARY LOCATION NORMALLY INACCESSIBLE TO AN OPERATOR 1. SECONDARY OR LOCAL CONTROL ROOM. 2. FIELD OR LOCAL CONTROL PANEL. 3. REAR OF SECONDARY OR LOCAL PANEL OR CABINET MOUNTED. 4. NOT VISIBLE ON VIDEO DISPLAY. 5. NOT NORMALLY ACCESSIBLE TO AN OPERATOR AT DEVICE OR CONSOLE.	⊖	⊖	◇	

LINE DATA IDENTIFICATION

SERVICE (ALPHA)	SEQUENCE (NUMERIC)	SIZE & MATERIAL (NUMERIC) (ALPHA)
XXX	– XXXX –	XX&XX
XXXX	– XXXX –	XXXX
INSUL. TYPE (NOTE 2)	THICKNESS (NUMERIC)	OPTIONAL (USER DEFINED)

OFF-PAGE CONNECTORS AND TIE-IN SYMBOL

OFF-PLOT CONNECTOR — CONNECTOR NUMBER — SERVICE DESCRIPTION / P&ID NO

UTILITY CONNECTOR — CONNECTOR NUMBER — XXXXX / P&ID NO

TIE-IN SYMBOL — TIE-IN NUMBER — T / XXXX

VALVE SYMBOLS

- GATE VALVE
- CHECK VALVE
- STOP CHECK VALVE
- GLOBE VALVE
- BUTTERFLY VALVE
- NEEDLE VALVE
- BALL VALVE
- GENERIC ROTARY VALVE
- PLUG VALVE
- DIAPHRAGM VALVE
- 3-WAY VALVE
- 4-WAY VALVE
- PINCH VALVE
- ANGLE VALVE
- KNIFE VALVE

PIPING SPECIALTY ITEMS

- Y-TYPE STRAINER
- CONE STRAINER
- T-TYPE STRAINER
- DUPLEX STRAINER
- BASKET STRAINER
- TEMPORARY STRAINER
- FILTER
- DETONATION ARRESTOR (D)
- FLAME ARRESTOR (F)
- STEAM TRAP (T)
- EXHAUST HEAD
- IN-LINE SILENCER (S)
- VENT SILENCER (S)
- EJECTOR
- REMOVABLE SPOOL (RS)
- DESUPERHEATER (DS)
- FLEXIBLE HOSE
- EXPANSION JOINT
- DAMPER
- BREATHER
- VENT COVER
- IN-LINE MIXER
- DIVERTER VALVE
- ROTARY VALVE
- EXCESS FLOW VALVE
- PULSATION DAMPENER

PIPING FITTINGS

- FLANGE
- WELDED CONNECTION
- CAP (D)
- CONCENTRIC REDUCER
- ECCENTRIC REDUCER
- HOSE CONNECTION
- SPACER
- BLANK
- OPEN FIGURE 8 BLIND
- CLOSED FIGURE 8 BLIND
- PLUG
- BLIND FLANGE

MISC INSTRUMENT SYMBOLS

- CHEMICAL SEAL- DIAPHRAGM
- PILOT LIGHT OR GAUGE GLASS ILLUMINATOR
- DUAL FUNCTION OR INSTRUMENTS SHARING COMMON HOUSING
- UNDEFINED INTERLOCK LOGIC (I)
- INSTRUMENT WITH LONG TAG NUMBER (FC 130-99)

INSTRUMENT LINE SYMBOLS

- INSTRUMENT SUPPLY OR CONNECTION TO PROCESS
- PNEUMATIC SIGNAL
- ELECTRIC SIGNAL
- HYDRAULIC SIGNAL
- CAPILLARY TUBE
- ELECTROMAGNETIC, SONIC, OPTICAL, OR NUCLEAR SIGNAL
- SOFTWARE OR DATA LINK
- MECHANICAL LINK

PIPING LINE SYMBOLS

- PRIMARY (AG & UG)
- SECONDARY / UTILITY (AG & UG)
- FUTURE OR EXISTING ON NEW P&IDs
- JACKETED OR DOUBLE CONTAINMENT

CONTROL VALVE ACTUATOR SYMBOLS

- MANUAL OPERATOR
- DIAPHRAGM
- PRESSURE BALANCED DIAPHRAGM
- HANDWHEEL WITH ACTUATOR
- CYLINDER – PISTON
- MOTOR OPERATED (M)
- ELECTRO-HYDRAULIC (E/H)
- SINGLE SOLENOID (S)
- SINGLE SOLENOID – MANUAL RESET (S, R)
- SINGLE SOLENOID – REMOTE RESET (S, R)

TYPICAL CONTROL VALVE WITH POSITIONER AND SOLENOID

SELF ACTUATED DEVICES

- RUPTURE DISC – PRESSURE RELIEF SAFETY HEAD FOR PRESSURE RELIEF (EXPLOSION PANEL)
- RUPTURE DISC – VACUUM RELIEF SAFETY HEAD FOR VACUUM RELIEF (EXPLOSION PANEL)
- PRESSURE RELIEF – SAFETY VALVE
- VACUUM RELIEF VALVE
- PRESSURE AND VACUUM RELIEF VALVE CONSERVATION VENT
- PILOT OPERATED RELIEF VALVE WITH REMOTE SENSOR (USE APPROPRIATE RELIEF VALVE SYMBOL)
- PRESSURE REDUCING REGULATOR (SELF-CONTAINED)
- BACK PRESSURE REGULATOR (SELF-CONTAINED)
- BACK PRESSURE REGULATOR W/ EXTERNAL TAP
- PRESSURE REDUCING REGULATOR W/ EXTERNAL TAP
- DIFFERENTIAL PRESSURE REDUCING REGULATOR
- TEMPERATURE REGULATOR FILLED SYSTEM TYPE

MISCELLANEOUS SYMBOLS

- NOTE REFERENCE SYMBOL (XX = NOTE NUMBER, ROTATE ARROW AS REQUIRED)
- UNASSIGNED1 / UNASSIGNED2 — POINT OF CHANGE IN LINE CLASS OR INSULATION REQUIREMENT
- BATTERY LIMITS (OR MATCH LINE)
- P XXXX — PURGE CONNECTION (XXXX = PURGE PRESSURE AND MEDIUM)
- SC XX/YY — SAMPLE CONNECTION (XX/YY = TYPE/NUMBER)
- PACKAGED EQUIPMENT LIMITS

PRIMARY ELEMENT SYMBOLS (FLOW)

- XX — GENERAL SYMBOL IN-LINE ELEMENT XX = FS, FC, FE, FT
- FT XXXX — IN-LINE FLOW ELEMENT WITH INTEGRAL TRANSMITTER XXXX = MASS, CORIOLIS, THERMAL, INT. ORIFICE ...
- FT / FE XXXX — IN-LINE FLOW ELEMENT WITH SEPARATE TRANSMITTER XXXX = MASS, CORIOLIS, THERMAL...
- ORIFICE
- MAGNETIC (M)
- TURBINE OR PROPELLER
- ULTRASONIC
- VORTEX
- PITOT TUBE
- AVERAGING PITOT TUBE
- FLOW NOZZLE
- VENTURI
- WEDGE METER
- FLUME
- WEIR
- POSITIVE DISPLACEMENT
- ORIFICE IN QUICK CHANGE FITTING
- TARGET
- FI — ROTAMETER WITH INTEGRAL VALVE (SHOWN WITH OPTIONAL INTEGRAL VALVE)
- FS* — FLOW SWITCH * = H/L
- FG — FLOW GLASS
- FLOW CONDITIONING DEVICES (e.g., STRAIGHTENING VANES)
- FO — RESTRICTION ORIFICE
- ROTAMETER

INSTRUMENT FUNTION SYMBOLS

Σ	SUMMING	>	HIGH SELECT
Σ/n	AVERAGING	<	LOW SELECT
Δ	DIFFERENCE	▷	HIGH LIMIT
X	MULTIPLYING	◁	LOW LIMIT
÷	DIVIDING	±	BIAS
√	SQUARE ROOT	f(x)	UNSPECIFIED FUNCTION
X^n	EXPONENTIAL		USER DEFINED
/	CONVERSION INPUT/OUTPUT	*/*	A ANALOG, B BINARY, D DIGITAL, E VOLTAGE, H HYDRAULIC, I CURRENT, O ELECTROMAGNETIC, SONIC, P PNEUMATIC, R RESISTANCE (ELECTRICAL)

DRAIN CONNECTORS

CLOSED DRAIN — CONNECTOR NUMBER XXXXX; DESTINATION LINE SERVICE CODE YYY; P&ID NO

OPEN DRAIN — CONNECTOR NUMBER XXXXX; DESTINATION LINE SERVICE CODE YYY; P&ID NO

CLOSED DRAIN (NO P&ID) — DESTINATION LINE SERVICE CODE YYY

OPEN DRAIN (NO P&ID) — DESTINATION LINE SERVICE CODE YYY

FOR REVIEW

SR 514994

ENERCON
12470 TELECOM DRIVE, SUITE 401
TEMPLE TERRACE, FLORIDA 33637
FLORIDA CERTIFICATE OF REGISTRATION NO. P16327

REV	DATE	REVISION DESCRIPTION	DMA	REQ	TO	SB
			BY	CH	COR	APR
A	12/29/22	ISSUED FOR REVIEW				

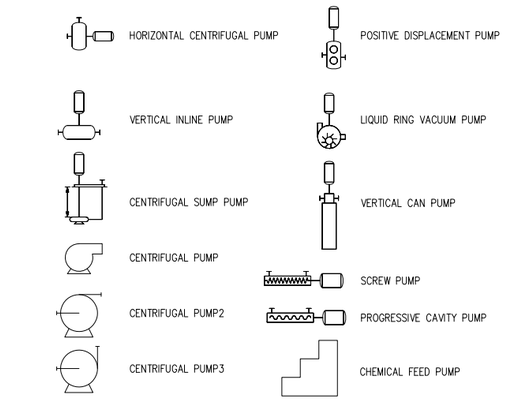
FPL

SYSTEM: WSD	DISCIPLINE: M	PLANT/UNIT: OKEECHOBEE CLEAN ENERGY CENTER	BAR CODE
SCALE: NONE	CAD FILE NAME: FPL-00064-P20-000-1	TITLE: POTABLE WATER SUPPLY PIPING & INSTRUMENTATION DIAGRAM STANDARD SYMBOLS	
DRAWING SIZE: D(22"x34")	FPL ARCHIVE NAME: FPL-00064-P20-000-1		
DRAWING NUMBER: FPL00075-P20-000-1		SHEET: 1 of 2	REV: A

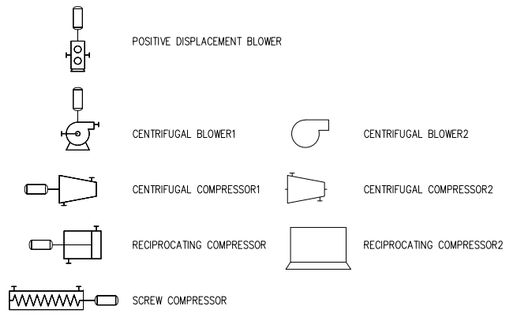
FPCBDR-D 5/09

TECHNICAL ACCEPTANCE	ORG	BY	DATE
ENGINEERING ORGANIZATION			
WALKDOWN INFORMATION	**ORG**	**BY**	**DATE**
AS-BUILT INFORMATION			

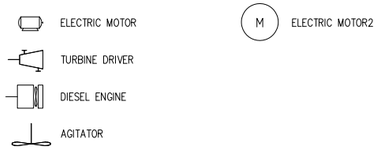
EQUIPMENT SYMBOLS PUMPS



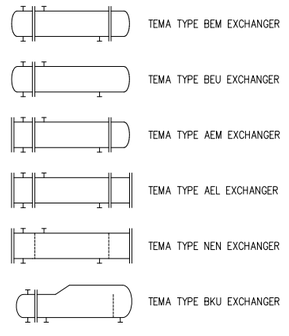
EQUIPMENT SYMBOLS COMPRESSORS & BLOWERS



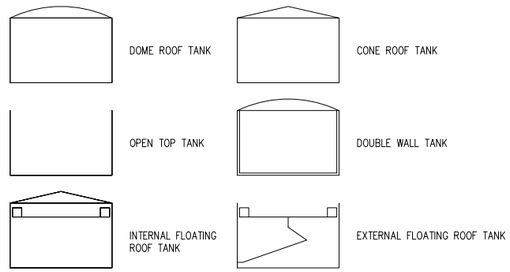
EQUIPMENT SYMBOLS DRIVERS & AGITATOR/MIXER



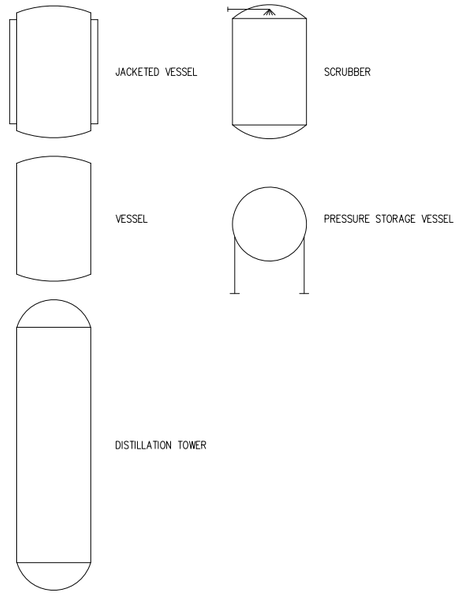
EQUIPMENT SYMBOLS TEMA TYPE EXCHANGERS



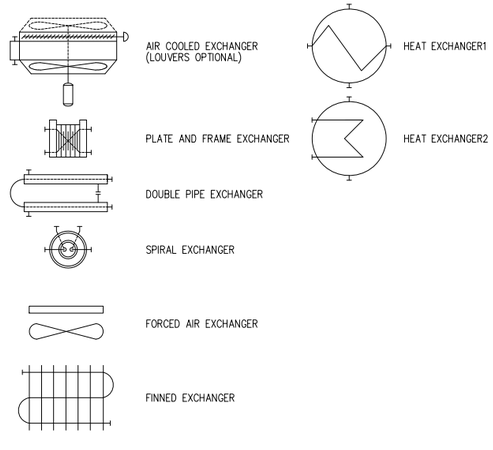
EQUIPMENT SYMBOLS STORAGE TANKS



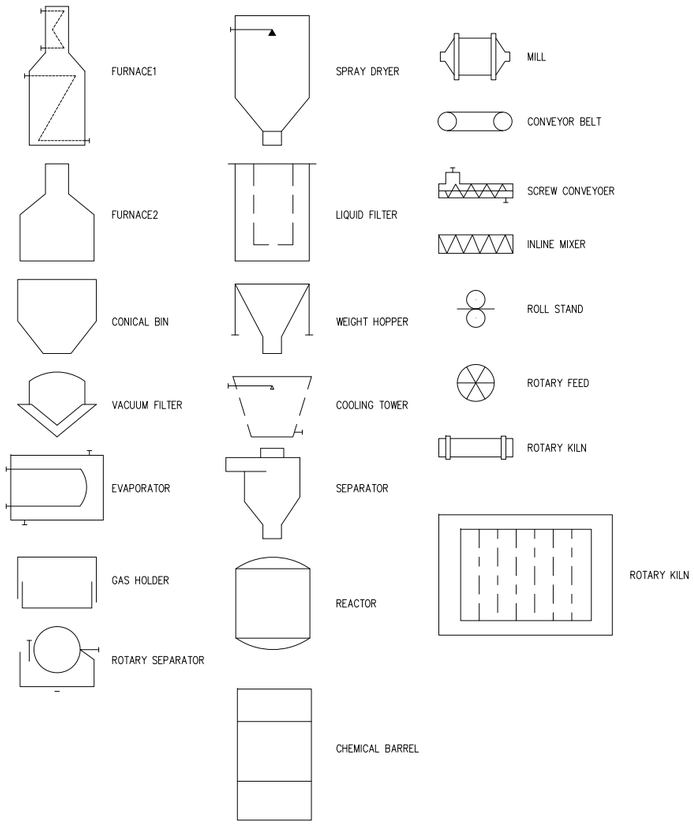
EQUIPMENT SYMBOLS VESSELS



EQUIPMENT SYMBOLS MISCELLANEOUS EXCHANGERS



EQUIPMENT SYMBOLS MISCELLANEOUS



REV	DATE	REVISION DESCRIPTION	DMA BY	REQ CH	TO COR	SB APR	ORG
A	12/29/22	ISSUED FOR REVIEW					

SR 514994

FOR REVIEW

ENERCON
12470 TELECOM DRIVE, SUITE 401
TEMPLE TERRACE, FLORIDA 33637
FLORIDA CERTIFICATE OF REGISTRATION NO. P16327

FPL

SYSTEM	DISCIPLINE	PLANT/UNIT	BAR CODE
WSD	M	OKEECHOBEE CLEAN ENERGY CENTER	
SCALE: NONE	CAD FILE NAME: FPL-00064-P20-000-2	TITLE: POTABLE WATER SUPPLY PIPING & INSTRUMENTATION DIAGRAM STANDARD SYMBOLS	
DRAWING SIZE: D(22"x34")	FPL ARCHIVE NAME: FPL-00064-P20-000-2		
DRAWING NUMBER: FPL00075-P20-000-2		SHEET: 2 of 2	REV: A

FPGBDR-D 5/09

TECHNICAL ACCEPTANCE
ENGINEERING ORGANIZATION | ORG | BY | DATE

WALKDOWN INFORMATION
AS-BUILT INFORMATION | ORG | BY | DATE

STATIC MIXER

ST. STL. PVC
NO (M)

ST. STL. PVC
NC (M)

FROM SURFICAL WELL PUMP #1 (WSD-PP-0004)
E-D004687-WSDM00001
WSD-0102-3SS

FROM BACKWASH PUMPS
FPL00064-P20-002
WSD-3147-3SS

AIT XXX
RESIDUAL CHLORINE

A

FILTER
1WSD-TK-0010

CP

FILTER
1WSD-TK-0010

DUPLEX FILTER SKID
FOR P&ID SEE DWG. 13032286

3" PVC
BACKWASH/RINSE OUTLET
FPL00064-P20-003

AIT XXX
ORP SODIUM BISULFATE

3" PVC
SERVICE WATER TO NANOFILTRATION
FPL00064-P20-003

STATIC MIXER

¾" PVC

2" PVC
2" PVC
TO UNDERGROUND DRAIN SYSTEM
FPL00064-P20-003

SODIUM HYPOCHLORITE TO NANO FILTER PERMEATE
FPL00064-P20-003

SODIUM HYPOCHLORITE TO POTABLE WATER
FPL00064-P20-003

PUMP SPEED CONTROL (SC) AO
PUMP SPEED FEEDBACK (SI) AI
PUMP START COMMAND (YC) DO
PUMP FAULT INDICATION (YAI) DI
PUMP IN REMOTE (YI) DI

PUMP SKID TERMINAL BOX

SODIUM HYPOCHLORITE PUMP WSD-PP-XXX-A
SODIUM HYPOCHLORITE PUMP WSD-PP-XXX-B
SODIUM HYPOCHLORITE SKID A

SODIUM HYPOCHLORITE PUMP WSD-PP-XXX-C
SODIUM HYPOCHLORITE PUMP WSD-PP-XXX-D
SODIUM HYPOCHLORITE SKID B

SODIUM HYPOCHLORITE PUMP WSD-PP-XXX-E
SODIUM HYPOCHLORITE PUMP WSD-PP-XXX-F
SODIUM HYPOCHLORITE SKID C

SODIUM HYPOCHLORITE (TOTE)

PUMP SPEED CONTROL (SC) AO
PUMP SPEED FEEDBACK (SI) AI
PUMP START COMMAND (YC) DO
PUMP FAULT INDICATION (YAI) DI
PUMP IN REMOTE (YI) DI

PUMP SKID TERMINAL BOX

SODIUM BISULFITE PUMP WSD-PP-XXX-A
SODIUM BISULFITE PUMP WSD-PP-XXX-B
SODIUM BISULFITE SKID

SODIUM BISULFITE (35 GALLON BARREL)

PUMP SPEED CONTROL (SC) AO
PUMP SPEED FEEDBACK (SI) AI
PUMP START COMMAND (YC) DO
PUMP FAULT INDICATION (YAI) DI
PUMP IN REMOTE (YI) DI

PUMP SKID TERMINAL BOX

ANTISCALANT PUMP WSD-PP-XXX-A
ANTISCALANT PUMP WSD-PP-XXX-B
ANTISCALANT SKID

ANTISCALANT (35 GALLON BARREL)

REV	DATE	REVISION DESCRIPTION	DMA BY	REQ CH	TO COR	SB APR	. ORG
A	11/18/22	ISSUED FOR REVIEW					

SR 514994

FOR REVIEW

ENERCON
12470 TELECOM DRIVE, SUITE 401
TEMPLE TERRACE, FLORIDA 33637
FLORIDA CERTIFICATE OF REGISTRATION NO. P16327

FPL

SYSTEM: WSD	DISCIPLINE: M	PLANT/UNIT: OKEECHOBEE CLEAN ENERGY CENTER	BAR CODE
SCALE: NONE	CAD FILE NAME: FPL00064-P20-001	TITLE: POTABLE WATER SUPPLY PIPING & INSTRUMENTATION DIAGRAM	
DRAWING SIZE: D(22"x34")	FPL ARCHIVE NAME: FPL00064-P20-001		
DRAWING NUMBER: FPL00064-P20-001		SHEET: 1 of 1	REV: A

FPCBDR-D 5/09

TECHNICAL ACCEPTANCE | ORG | BY | DATE
ENGINEERING ORGANIZATION

WALKDOWN INFORMATION | ORG | BY | DATE
AS-BUILT INFORMATION

SERVICE WATER FROM UV OXIDATION
FPL00064-P20-003

RESIDUAL CHORINE
AIT XXX

VA-3165-01 3"
WSD-3125-3SS
LI

LT 0910-01
24" MANWAY
6"

STORAGE TANK
(7,600 GALLON)
1WSD-TK-0014

24" MANWAY

3" VA-3164-01
3" 3" 3"
WSD-3144-3SS
3" VA-3166-01

4" 2" 3"x2" VA-3179-01
WSD-3150-4PVC

ZSO ZSO FBV 0110-01
WSD-3146-4SS

TE 0610-01

WSD-3138-3SS

WSD-3139-1½SS
3"x1½" VA-3167-01
1½" ½" VA-3168-01
EJ-0610-01
HIGH-SERVICE PUMP
1WSD-PP-0010-A

PUMP START COMMAND YC DO
PUMP RUN STATUS YI DI
PUMP FAULT INDICATION YI DI
PUMP IN REMOTE YAI DI

PI 0610-01
VA-3170-01 ¾"
¾" VA-3169-01
WSD-3140-2SS
EJ-0611-01
2"x1" CV-0615-01
VA-3171-01 2"

WSD-3142-1½SS
3"x1½" VA-3172-01
1½" ½" VA-3173-01
EJ-0612-01
HIGH-SERVICE PUMP
1WSD-PP-0011-B

PUMP START COMMAND YC DO
PUMP RUN STATUS YI DI
PUMP FAULT INDICATION YI DI
PUMP IN REMOTE YAI DI

PI 0611-01
VA-3175-01 ¾"
¾" VA-3174-01
WSD-3143-2SS
EJ-0613-01
2"x1" CV-0616-01
VA-3176-01 2"
WSD-3140-2SS

LOGIC SYMBOL TO WELL PUMP #1
WSDM00001_S01

POTABLE WATER TO HYDROPNEUMATIC TANK
FPL-00064-P20-003

WSD-3151-3PCV

OVERFLOW & DRAINS
FPL-00064-P20-003

HS A/M
PUMP START COMMAND YC DO
PUMP RUN STATUS YI DI
PUMP FAULT INDICATION YI DI
PUMP IN REMOTE YAI DI

PI 0612-01
VA-3182-01 ¾"
¾" VA-3881-01
VENT 1" VA-3184-01
2"x3" WSD-3147-3SS
CV-0617-01 3" VA-3183-01

4"x3" WSD-3146-3SS
3" VA-3179-01
EJ-0614-01
EJ-0615-01
BACKWASH PUMP
1WSD-PP-0012-A
VA-3180-01 ½"

HS A/M
PUMP START COMMAND YC DO
PUMP RUN STATUS YI DI
PUMP FAULT INDICATION YI DI
PUMP IN REMOTE YAI DI

PI 0613-01
VA-3188-01 ¾"
¾" VA-3187-01
2"x3" WSD-3149-3SS
CV-0618-01 3" VA-3189-01

PI
PIT 0912-01
VA-3191-01 ¾"
¾" VA-3190-01
WSD-3147-3SS

4"x3" WSD-3148-3SS
3" VA-3185-01
EJ-0616-01
EJ-0617-01
BACKWASH PUMP
1WSD-PP-0013-B
VA-3186-01 ½"

BACKWASH FEED WATER TO FILTERS
FPL00064-P20-001

BACKWASH PUMPS	
MODEL	GOULDS 3196
SIZE	2x3-6
IMPELLER	5.1875
DESIGN FLOW	200 GPM
TDH	95.0 FT.
SHUTOFF HD	105.6 FT.
HP	10

HIGH SERVICE PUMPS	
MODEL	GOULDS 3196
SIZE	1x1½-8
IMPELLER	6.9688
DESIGN FLOW	60.0 GPM
TDH	215.0 FT.
SHUTOFF HD	218.6 FT.
HP	15

FOR REVIEW

SR 514994

ENERCON
12470 TELECOM DRIVE, SUITE 401
TEMPLE TERRACE, FLORIDA 33637
FLORIDA CERTIFICATE OF REGISTRATION NO. P16327

REV	DATE	REVISION DESCRIPTION	DMA BY	REQ CH	TO COR	SB APR	. ORG
A	11/18/22	ISSUED FOR REVIEW					

FPL

SYSTEM: WSD	DISCIPLINE: M	PLANT/UNIT: OKEECHOBEE CLEAN ENERGY CENTER	BAR CODE
SCALE: NONE	CAD FILE NAME: FPL00064-P20-002	TITLE: POTABLE WATER SUPPLY PIPING & INSTRUMENTATION DIAGRAM	
DRAWING SIZE: D(22"x34")	FPL ARCHIVE NAME: FPL00064-P20-002		
DRAWING NUMBER: FPL00064-P20-002		SHEET: 1 of 1	REV: A

FPCBDR-D 5/09

TECHNICAL ACCEPTANCE | ORG | BY | DATE | ENGINEERING ORGANIZATION

WALKDOWN INFORMATION | ORG | BY | DATE | AS-BUILT INFORMATION

BACKWASH/RINSE OUTLET FROM DUPLEX FILTERS
FPL00064-P20-001

3" PVC

PVC | HDPE (U/G)

TP 02

3" HDPE WWC-0601-3PRC

TO WASTEWATER TRANSFER SUMP
WSDM00007_S01

CP

UV OXIDATION LAMP SKID

STATIC MIXER

PERMEATE WATER TO STORAGE TANK
FPL00064-P20-002

CONCENTRATE 1½" PVC

SODIUM HYPOCHLORITE FROM SKID B
FPL00064-P20-001

3" PVC

SERVICE WATER FROM DUPLEX FILTERS
FPL00064-P20-001

3" PVC

A

C

3"x2"

PERMEATE CIP RETURN

3"x2"

D

B

CP

CONCENTRATE CIP RETURN

F

NANOFILTRATION SKID
1WSD-TK-0015
FOR P&ID's SEE DWG's. 2900000PA-AP-01 THRU 2900000PA-AP-04

3" PVC

3" PVC

A

CP

CIP TANK
1WSD-TK-0010

1½" PVC

2" PVC

K

C CIP FEED

B 1½" PVC

I OVERFLOW 3" PVC

J TANK DRAIN 2" PVC

CIP SKID

SYSTEM DRAIN

D FOR P&ID SEE DWG. 1318217

WSD-3151-3PCV

TP 03

HDPE (U/G) PVC

WWC-0217-6PRC

TO UNDERGROUND DRAIN SYSTEM
WWCM00002_S01

HYDROPNEUMATIC TANK
(3,000 GALLON)
1WSD-TK-0015

CP

AIR COMPRESSOR

TANK DRAINS FROM DUPLEX FILTERS
FPL00064-P20-001

OVERFLOW/DRAIN FROM STORAGE TANK
FPL-00064-P20-002

WSD-3151-3PCV

PIT 0911-01

VA-3178-01

¾"

¾"

VA-3177-01

WSD-3141-2SS

STATIC MIXER

AIT XXX RESIDUAL CHORINE

ST. STL. | HDPE (U/G)

SP=150 PSIG

TP 01

3"x2"

0105-3BGHI-1MW

TO POTABLE WATER DISTRIBUTION SYSTEM
WSDM00001_S02

POTABLE WATER FROM HIGH SERVICE PUMPS
FPL-00064-P20-002

WSD-3140-2SS

SODIUM HYPOCHLORITE FROM SKID C
FPL00064-P20-001

FOR REVIEW

SR 514994

ENERCON
12470 TELECOM DRIVE, SUITE 401
TEMPLE TERRACE, FLORIDA 33637
FLORIDA CERTIFICATE OF REGISTRATION NO. P16327

FPL

SYSTEM: WSD	DISCIPLINE: M	PLANT/UNIT: OKEECHOBEE CLEAN ENERGY CENTER	BAR CODE
SCALE: NONE	CAD FILE NAME: FPL00064-P20-003	TITLE: POTABLE WATER SUPPLY PIPING & INSTRUMENTATION DIAGRAM	
DRAWING SIZE: D(22"x34")	FPL ARCHIVE NAME: FPL00064-P20-003		
DRAWING NUMBER: FPL00064-P20-003		SHEET: 1 of 1	REV: A

REV	DATE	REVISION DESCRIPTION	DMA BY	REQ CH	TO COR	SB APR	ORG
A	11/18/22	ISSUED FOR REVIEW					

FPCBDR-D 5/09

APPENDICES

Appendix A

FDEP Permit, PWS ID No. 4474515

FLORIDA DEPARTMENT OF Environmental Protection

Southeast District Office
3301 Gun Club Road, MSC 7210-1
West Palm Beach, FL 33406
561-681-6600

Ron DeSantis
Governor

Jeanette Nuñez
Lt. Governor

Noah Valenstein
Secretary

December 13, 2019

In the Matter of an Application for Permit by:
Ms. Tiffany Brady, Environmental Specialist
Florida Power and Light (FPL), OCEC
21505 SR 60
Vero Beach, Florida 32966
Email: Tiffany.Brady@fpl.com

DEP File No.: 0382738-001-WC
Okeechobee County
FPL OCEC
Transfer from DOH to DEP

NOTICE OF PERMIT ISSUANCE

Enclosed is Permit Number 0382738-001-WC to transfer water treatment system from Department of Health to Department of Environmental Protection and to reclassify from Limited Use to Non-Transient Non-Community for Florida Power and Light, Okeechobee Water Treatment Plant (WTP), Vero Beach, Okeechobee County, Florida. This permit is issued under Section 403.087 of the Florida Statutes.

A person whose substantial interests are affected by the proposed permitting decision of the Department may petition for an administrative hearing in accordance with Sections 120.569 and 120.57 of the Florida Statutes.

The petition must contain the information set forth below and must be filed (received) in the Department of Environmental Protection, Office of General Counsel, Mail Station 35, 3900 Commonwealth Boulevard, Tallahassee, Florida, 32399-3000. Petitions filed by the permit applicant or any of the parties listed below must be filed within fourteen days of receipt of this notice of intent. Petitions filed by any other person must be filed within fourteen days of publication of the public notice or within fourteen days of receipt of this notice of intent, whichever occurs first. A petitioner must mail a copy of the petition to the applicant at the address indicated above, at the time of filing. The failure of any person to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under Sections 120.569 and 120.57 of the Florida Statutes, or to intervene in this proceeding and participate as a party to it. Any subsequent intervention will be only at the discretion of the presiding officer upon the filing of a motion in compliance with rule 28-5.207 of the Florida Administrative Code.

A petition must contain the following information:

(a) The name, address, and telephone number of each petitioner; the Department permit identification number and the county in which the subject matter or activity is located;
(b) A statement of how and when each petitioner received notice of the Department action;

(c) A statement of how each petitioner's substantial interests are affected by the Department action;
(d) A statement of the material facts disputed by the petitioner, if any;
(e) A statement of facts that the petitioner contends warrant reversal or modification of the Department action;
(f) A statement of which rules or statutes the petitioner contends require reversal or modification of the Department action; and
(g) A statement of the relief sought by the petitioner, stating precisely the action that the petitioner wants the Department to take.

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that the final action of the Department may be different from the position taken by it in this notice of intent. Persons whose substantial interests will be affected by any such final decision of the Department on the application have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above.

Mediation under Section 120.573 of the Florida Statutes is not available for this proceeding.

This action is final and effective on the date filed with the Clerk of the Department unless a petition is filed in accordance with the above. Upon the timely filing of a petition this order will not be effective until further order of the Department.

Any party to the order has the right to seek judicial review of the order under Section 120.68 of the Florida Statutes, by the filing of a notice of appeal under rule 9.110 of the Florida Rules of Appellate Procedure with the Clerk of the Department in the Office of General Counsel, 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida, 32399-3000; and by filing a copy of the notice of appeal accompanied by the applicable filing fees with the appropriate district court of appeal. The notice of appeal must be filed within 30 days from the date when the final order is filed with the Clerk of the Department.

This space intentionally left blank

EXECUTION AND CLERKING
Executed in West Palm Beach, Florida.
STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION



December 13, 2019

_____

John Kent Edwards Date
Permitting Program Administrator

JKE/CW/MP

CERTIFICATE OF SERVICE
The undersigned duly designated deputy clerk hereby certifies that this document and all attachments were sent on the filing date below to the following listed persons:

Electronic Copies Furnished to:

Dover Engineering – Phillip R. Dover, P.E. – PDover@doverengr.com
FDEP – Jocelyn.Labbe@FloridaDEP.Gov Mark.Peters@FloridaDEP.Gov
Okeechobee County Health Department – Douglas.McCoy@flhealth.gov
FPL – William.Cavender@fpl.com
CES Consultants – Walter "Bud" Goblisch, P.E. – bgoblisch@cesconsult.com

FILING AND ACKNOWLEDGMENT
FILED, on this date, under Section 120.52(7), Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.



_____ December 13, 2019
Clerk Date

FLORIDA DEPARTMENT OF
Environmental Protection

Southeast District Office
3301 Gun Club Road, MSC 7210-1
West Palm Beach, FL 33406
561-681-6600

Ron DeSantis
Governor

Jeanette Nuñez
Lt. Governor

Noah Valenstein
Secretary

December 13, 2019

PERMITTEE:
Ms. Tiffany Brady, Environmental Specialist
Florida Power and Light (FPL),
Okeechobee Clean Energy Center (OCEC)
21505 SR 60
Vero Beach, Florida 32966
Email: Tiffany.Brady@fpl.com

PWS ID. NO.: 4474515
PERMIT NUMBER: 0382738-001-WC
DATE OF ISSUE: December 13, 2019
EXPIRATION DATE: December 12, 2024
COUNTY: Okeechobee
PROJECT: Transfer from DOH to DEP

This permit is issued under the provisions of Chapter 403, Florida Statutes (F.S.), and Florida Administrative Code (F.A.C.) Chapters 62-4, 62-550, 62-555 and 62-560. The above-named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawings, plans, and other documents attached hereto or on file with the Department and made a part hereof and specifically described as follows:

TO: Transfer existing WTP From DOH to DEP, the maximum permitted capacity is 83,420 gpd

PROPOSED CONSTRUCTION INCLUDES:

- One (1) Goulds Well Pump Model 85GS75, 7.5 hp motor 110 gpm @ 170 ft
- Potable Skid Manufactured by Furey Filters and Pumps Inc: Two (2) Pumps 100 percent capacity, horizontal, centrifugal, Flowserve Model 2K 2x1-10A driven by 10 hp motor. The potable point design is at 87 gpm at 138 TDH.
- One (1) 2000 gallons; Potable Atmospheric Storage Tank provided by Furey Filters and Pumps Inc. with bypass lines and isolation valves
- Emergency Safety Eyewash Station Haws Model 8300-8309 Axion Combination Safety shower; the eyewash/shower are in different locations and designed per ANSI Z358.1
- Three (3) NXT3150 24”x72” Cubic feet filter, Filox media, fleck 3150 control valve
- Chemical feed pump t55-45mhp10 stenner chemical feed pump
- Chemical Tank t4123 35 gallon
- Wessel Hydro-Pneumatic Tank FXA 1000
- All components and appurtenance meet NSF/ANSI 61 Standards

IN ACCORDANCE WITH: The construction permit application and engineering Preliminary Design Report (PDR) dated and received December 4, 2019 and Request for Additional Information dated December 5, 2019, and response prepared by Phillip Dover, P.E. of Dover Engineering received by Department on December 12, 2019.

LOCATED AT: 21505 SR 60, Vero Beach, Florida 32966

TO SERVE: The existing FPL Okeechobee OCEC

SUBJECT TO: General Conditions**,** and Specific Conditions below.

Work must be conducted in accordance with the General and Specific Conditions, attached hereto.

Issued this 12th day of December 2019

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION

Sincerely

December 13, 2019

John Kent Edwards Date
Permitting Program Administrator

JKE/WC/MP

This space intentionally left blank

A. General Conditions

The permittee shall be aware of and operate under the Permit Conditions below. These applicable conditions are binding upon the permittee and enforceable pursuant to Chapter 403, Florida Statutes. [F.A.C. Rule 62-555.533(1)]

1. The terms, conditions, requirements, limitations and restrictions set forth in this permit, are "permit conditions" and are binding and enforceable pursuant to Sections 403.141, 403.727, or 403.859 through 403.861, F.S. The permittee is placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of these conditions.

2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.

3. As provided in Subsections 403.087(6) and 403.722(5), F.S., the issuance of this permit does not convey any vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state, or local laws or regulations. This permit is not a waiver of or approval of any other department permit that may be required for other aspects of the total project which are not addressed in this permit.

4. This permit conveys no title to land or water, does not constitute State recognition or acknowledgment of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.

5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, or plant life, or property caused by the construction or operation of this permitted source, or from penalties therefore; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.

6. The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed and used by the permittee to achieve compliance with the conditions of this permit, as required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.

7. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at reasonable times (reasonable time may depend on the nature of the concern being investigated), access to the premises where the permitted activity is located or conducted to:

    a. Have access to and copy any records that must be kept under conditions of the permit;
    b. Inspect the facility, equipment, practices, or operations regulated or required under this permit; and
    c. Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately provide the Department with the following information:

    a. A description of and cause of noncompliance; and
    b. The period of noncompliance, including dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the noncompliance. The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the Department for penalties or for revocation of this permit.

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except where such use is prescribed by Sections 403.111 and 403.73, F.S. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.

10. The permittee agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance; provided, however, the permittee does not waive any other rights granted by Florida Statutes or Department rules. A reasonable time for compliance with a new or amended surface water quality standard, other than those standards addressed in Rule 62-302.500, shall include a reasonable time to obtain or be denied a mixing zone for the new or amended standard.

11. This permit is transferable only upon Department approval in accordance with Rule 62-4.120 and 62-730.300, F.A.C., as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.

12. This permit or a copy thereof shall be kept at the work site of the permitted activity.

13. This permit also constitutes:

a. Determination of Best Available Control Technology (BACT)
b. Determination of Prevention of Significant Deterioration (PSD)
c. Certification of compliance with State Water Quality Standards (Section 401, PL 92-500)
d. Compliance with New Source Performance Standards

14. The permittee shall comply with the following:

a. Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records will be extended automatically unless otherwise stipulated by the Department.

b. The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the permit, copies of all reports required by this permit, and records of all data used to complete the application for this permit. These materials shall be retained at least three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.

c. Records of monitoring information shall include:
   i. the date, exact place, and time of sampling or measurements;
   ii. the person responsible for performing the sampling or measurements;
   iii. the dates analyses were performed;
   iv. the person responsible for performing the analyses;
   v. the analytical techniques or methods used;
   vi. the results of such analyses.

15. When requested by the Department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware the relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

B. Regulatory Section

1. All construction must be in accordance with this permit. Before commencing work on project changes for which a construction permit modification is required per 62-555.536(1), the permittee shall submit to the Department a written request for a permit modification. Each such request shall be accompanied by one copy of a revised construction permit

application, the proper processing fee and one copy of either a revised preliminary design report or revised drawings, specifications and design data. [F.A.C. Rule 62-555.536].

2. Permitted construction or alteration of public water supply systems must be supervised during construction by a professional engineer registered in the State of Florida if the project was designed under the responsible charge of a professional engineer licensed in the State of Florida. The permittee must retain the service of a professional engineer registered in the State of Florida to observe that construction of the project is in accordance with the engineering plans and specifications as submitted in support of the application for this permit. [F.A.C. Rule 62-555.520(3)].

3. If prehistoric or historic artifacts, such as pottery or ceramics, stone tools or metal implements, dugout canoe remains, or any other physical remains that could be associated with Native American cultures, or early colonial or American settlement are encountered at any time within the project site area, the permitted project should cease all activities involving subsurface disturbance in the immediate vicinity of such discoveries. The permittee, or other designee, should contact the Florida Department of State, Division of Historical Resources, Compliance and Review Section at 850.245.6333 or 800.847.7278, as well as the appropriate permitting agency office. Project activities should not resume without verbal and/or written authorization from the Division of Historical Resources and the permitting agency. In the event that unmarked human remains are encountered during permitted activities, all work shall stop immediately, and the proper authorities notified in accordance with Section 872.05, *Florida Statutes*.

4. If delays will cause project completion to extend beyond the expiration date of this permit, the permittee shall submit to the Department a request to extend the expiration date of this permit including the appropriate processing fee. This request shall specify the reasons for the delay and shall be submitted to the Department for approval prior to the expiration date of this permit. Note that no specific construction permit shall be extended so as to remain in effect longer than five years. [F.A.C. Rule 62-555.536(4)]. {OPTIONAL}

5. In accordance with General Condition #11 of this permit, this permit is transferable only upon Department approval. Persons proposing to transfer this permit must apply jointly for a transfer of the permit within 30 days after the sale or legal transfer of ownership of the permitted project that has not been cleared for service by the Department using form, 62-555.900(8), Application for Transfer of a PWS Construction Permit along with the appropriate fee. [F.A.C. Rule 62-555.536(5)]

6. This permit satisfies Drinking Water permitting requirements only and does not authorize construction or operation of this facility prior to obtaining all other necessary permits from other program areas within the Department, or required permits from other state, federal, or local agencies.

7. If gasoline contamination is found at the construction site, work shall be stopped, and the proper authorities notified. With the approval of the Department, ductile iron pipe and fittings, and solvent resistant gaskets materials shall be used in the contaminated area. The

ductile pipe shall be used in the contaminated area. The ductile iron pipe shall extend 100 feet beyond any solvent noted. Any contaminated soil that is excavated shall be placed on an impermeable mat, covered with waterproof covering, and held for disposal. If the site cannot be properly cleaned, then consultation with the Department is necessary prior to continuing with the project construction.

8. This permit does not constitute approval of construction on jurisdictional wetland areas; therefore, such approval must be obtained separately from the Water Management District or from DEP ERP Section, as applicable, Permittee shall provide a copy of the permit approval to the Department if water main installation involves activities on wetlands.

C. Construction Standards

1. All products, including paints, which shall come into contact with potable water, either directly or indirectly, shall conform to National Sanitation Foundation (NSF) International, Water Chemicals Codex, Food Chemicals Codex, American Water Works Association (AWWA) Standards and the Food and Drug Administration, as provided in Rule 62-555.320(3), F.A.C.
2. Water supply facilities, including mains, pipe, fittings, valves, fire hydrants and other materials shall be installed in accordance with the latest applicable AWWA Standards and Department rules and regulations. The system shall be pressure and leak tested in accordance with AWWA Standard C600 C603, or C605, as applicable, and disinfected in accordance with AWWA Standard C651-653, as well as in accordance with Rule 62-555.340, F.A.C.
3. The installation or repairs of any public water system, or any plumbing in residential or nonresidential facilities providing water for human consumption, which is connected to a public water system shall be lead free in accordance with Rule 62-555.322, F.A.C.
7. The new or altered aboveground piping at the drinking water treatment plant shall be color coded and labeled as recommended in Section 2.14 of "Recommended Standards for Water Works, 1997 Edition". [F.A.C. Rule 62-555.320(10)]
8. Permittee shall ensure that there shall be no cross-connection with any non-potable water source in accordance with Rule 62-555.360, F.A.C.

D. Operational Requirements

1. The facility has been classified as a Category V, Class D water treatment plant. Accordingly, the lead or chief operator must be Class D or higher. Proof of staffing by a Class D or higher operator for [3 visits/week on nonconsecutive days for a total of 0.3 hour/week.] must be provided. [F.A.C. Rule 62-699.310] (Note: This condition would be added when appropriate and would be tailored to the WTP.)

2. The supplier of water shall operate and maintain the public water system so as to comply with applicable standards in F.A.C. Rule 62-550 and 62-555.350.

3. The permittee shall provide an operation and maintenance manual for the new or altered treatment facilities to fulfill the requirements under subsection 62-555.350(13), F.A.C. The manual shall contain operation and control procedures, and preventative maintenance and repair procedures, for all plant equipment and shall be made available for reference at the plant or at a convenient location near the plant. Bound and indexed equipment manufacturer manuals shall be considered sufficient to meet the requirements of the subsection.

4. The permittee shall submit a monthly operations report (MOR) DEP Form 62-555.900(x), to the Department no later than the tenth of each succeeding month. (Note x depends upon type of treatment)

5. The permittee shall have complete record drawings produced for the project in accordance with Rule 62-555.530(4), F.A.C.

6. The permittee or suppliers of water shall telephone the State Warning Point (SWP), at 1-800-320-0519 immediately (i.e., within two hours) after discovery of any actual or suspected sabotage or security breach, or any suspicious incident, involving a public water system in accordance with the F.A.C. Rule 62-555.350(10).

E. Monitoring Provisions

1. Permittee shall follow the guidelines of Chapters 62-550, 62-555, and 62-560, F.A.C., regarding public drinking water system standards, monitoring, reporting, permitting, construction, and operation.

   This facility is a Non-Transient Non-Community Water System as defined in F.A.C. Rule 62-550.200 and shall comply with the applicable chemical, radiological, lead and copper and water quality parameters, and bacteriological monitoring requirements of F.A.C. Rule 62-550. Such requirements shall be initiated within the quarter that the water treatment facility is placed into service (i.e. January—March or April—June, the preceding are examples of quarters) and the results submitted to the Department.

2. The water treatment plant shall maintain throughout the distribution system a minimum

continuous and effective free chlorine residual of 0.2 mg/l or its equivalent. A minimum system pressure of 20 psi must be maintained throughout the system. Also, safety equipment shall be provided and located outside of chlorine room. **OR**

The water treatment plant shall maintain throughout the distribution system a minimum combined chlorine residual of 0.6 mg/l or its equivalent. A minimum system pressure of 20 psi must be maintained throughout the system. Also, safety equipment shall be provided and located outside of chlorine room.

3. To address copper pipe corrosion control and potential black water issues, permittee shall collect at least one sample of raw water from each new well in accordance with F.A.C. Rule 62-555.315(5). The sample shall be analyzed for alkalinity, dissolved iron, dissolved oxygen (D.O.), pH, total sulfide, and turbidity, and the results shall be submitted to the Department.

F. Clearance Requirements

1. The permittee must instruct the engineer of record to request system clearance from the Department within sixty (60) days of completion of construction, testing and disinfecting the system. Bacteriological test results shall be considered unacceptable if the test were completed more than 60 days before the Department received the results. [F.A.C. Rule 62-555.340(2)(c)]

   Permitted construction or alteration of a public water system may not be placed into service until a letter of clearance has been issued by this Department. [F.A.C. Rule 62-555.345]

2. Prior to placing this project into service, Permittee shall submit, at a minimum, all of the following to the Department for evaluation and approval for operation, as provided in Rules 62-555.340 and 62-555.345, F.A.C.:

   a. The engineer's *Certification of Construction Completion and Request for Clearance to Place Permitted PWS Components into Operation* {DEP Form 62-555.900(9)};

   b. Certified record drawings, if there are any changes noted for the permitted project.

   c. Copy of a satisfactory pressure test of the process piping performed in accordance with AWWA Standards. [F.A.C. Rule 62-555.320(21)(a)(1)]

   d. Two consecutive days of satisfactory bacteriological analytical results (see paragraph 3 below).

   In order to facilitate the issuance of a letter of clearance, the Department requests that all of the above information be submitted as one package.

3. The new facilities shall be cleaned, disinfected, and bacteriologically cleared in accordance with Chapter 62-555, F.A.C. The bacteriological clearance data shall be submitted to the Department with the engineer's certification of construction completion. [Section 62-555.340 and 62-555.315(6)(b), F.A.C.

Appendix B

Supply Well Water Quality

ANALYTICAL LABORATORY
4669 SHEPHERD TRAIL
ROCKFORD, IL 61103-1294

TELEPHONE 815-877-3041
FACSIMILE 815-921-8165

CERTIFICATE OF ANALYSIS

Analysis NO : 158244

Job ID : J[2022AUG1]63818

Branch Org. Code : 112

FPL Okeechobee Cean Energy Center
100 FPL Landing
Okeechobee FL,

Sampled : 07/11/2022
Received : 08/01/2022
Completed : 08/11/2022
Purpose : Presale Activity
Supply/Source :
Sample Point : Potable Water Well Feed
Description : Well (Deep)

ATTN: Douglas Spolarich

CATIONS	RESULT	UNITS	ANIONS	RESULT	UNITS
Calcium (Ca)	288	mg/l CaCO3	Bicarb (HCO3)	283.5	mg/l CaCO3
Magnesium (Mg)	18.1	mg/l CaCO3	Fluoride (F)	<0.020	mg/l CaCO3
Sodium (Na)	59.4	mg/l CaCO3	Chloride (Cl)	65.6	mg/l CaCO3
Potassium (K)	2.4	mg/l CaCO3	Bromide (Br)	0.302	mg/l CaCO3
Iron (Fe)	1.12	mg/l	Nitrate (NO3)	0.234	mg/l CaCO3
Manganese (Mn)	0.058	mg/l	Phosphate (PO4)	1.02	mg/l CaCO3
Aluminum (Al)	<0.010	mg/l	Sulfate (SO4)	28.1	mg/l CaCO3
Barium (Ba)	0.049	mg/l	Silica (SiO2)	15.4	mg/l CaCO3
Strontium (Sr)	0.713	mg/l			
Copper (Cu)	<0.004	mg/l			
Zinc (Zn)	<0.004	mg/l			

OTHER PARAMETERS	RESULT	UNITS		RESULT	UNITS
pH	7.72		Total Hardness	306.11	mg/l CaCO3
Turbidity	6.69	NTU	TOC (C)	9.642	mg/l
Conductivity	743.3	uS/cm	Free (CO2) [1]	12.3	mg/l CaCO3

[1] Derived from Alkalinity and pH

ADDITIONAL TESTS	RESULT	UNITS
TDS (By Evaporation)	450	mg/l
Total Suspended Solids	1.3	mg/l

SDI 1.5

Field H2S 0.3 ppm

The reported results are representative of the sample as received.

OUR REPRESENTATIVE IN YOUR AREA IS:
Southeast GI

,

ANALYZED BY: Nicole Lyford

Florida Department of Environmental Protection
Safe Drinking Water Program Laboratory Reporting Format

OTHER CONTAMINANTS

Report Number / Job ID: A2008091001

PWS ID (From Page 1): 4474515

Contam ID	Contam Name	MCL	Units	Analysis Result	Qualifier*	Analytical Method	Lab MDL	Analysis Date	Analysis Time	DOH Lab Certification #
	Total Organic Carbon		mg/L	7.7		SM 5310B	0.50	09/23/2020	18:12	E84589

Reporting Format 62-550.730
Effective January 1995, Revised February 2010

*Results must be reported with appropriate qualifiers in accordance with Florida Administrative Code Rule 62-160, Table 1. Results qualified with A, F, H, N, O, T, Z, ?, *, are unacceptable for compliance with 62-550. Results qualified with a J, Q, R, or Y must be accompanied by written justification and will be evaluated on a case by case basis. To avoid a monitoring violation, unacceptable results must be replaced with acceptable results from samples collected during the same monitoring period.

Advanced Environmental Laboratories, Inc.

Advanced Environmental Laboratories, Inc
380 North Lake Blvd., Suite 1048Altamonte Springs, FL 32701
Payments: P.O. Box 551580 Jacksonville, FL 32255-1580
Phone: (407)937-1594
Fax: (407)937-1597

ANALYTICAL RESULTS

Workorder: A2008040 FPL OCEC

Lab ID: **A2008040001**
Sample ID: **Well**

Date Received: 09/17/20 14:45 Matrix: Drinking Water
Date Collected: 09/17/20 08:10

Sample Description:

Location: J01440

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: TOC,SM5310B,Water	Analytical Method: SM 5310B							
Total Organic Carbon	**7.2**		**mg/L**	**1**	1.0	0.50	9/23/2020 15:47	T

CERTIFICATE OF ANALYSIS

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Advanced Environmental Laboratories, Inc.

Advanced Environmental Laboratories, Inc
380 North Lake Blvd., Suite 1048Altamonte Springs, FL 32701
Payments: P.O. Box 551580 Jacksonville, FL 32255-1580
Phone: (407)937-1594
Fax: (407)937-1597

ANALYTICAL RESULTS

Workorder: A2009615 FPL OCEC

Lab ID: **A2009615001** Date Received: 11/11/20 14:30 Matrix: Drinking Water
Sample ID: **POE** Date Collected: 11/11/20 08:00

Sample Description: Location: J01440

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
METALS								
Analysis Desc: E200.7 Analysis,Drinking Waters	Preparation Method: EPA 200.7 Analytical Method: EPA 200.7							
Iron	0.40	I	mg/L	1	0.80	0.20	11/16/2020 14:45	J
WET CHEMISTRY								
Analysis Desc: Sulfide,SM4500S-D,Aqueous	Analytical Method: SM 4500-S D							
Sulfide	0.013	U	mg/L	1	0.050	0.013	11/16/2020 12:35	T

Lab ID: **A2009615002** Date Received: 11/11/20 14:30 Matrix: Drinking Water
Sample ID: **Well** Date Collected: 11/11/20 08:10

Sample Description: Location: J01440

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
METALS								
Analysis Desc: E200.7 Analysis,Drinking Water (w/Prep)	Analytical Method: EPA 200.7							
Iron	1.3		mg/L	1	0.80	0.20	11/23/2020 10:46	J
WET CHEMISTRY								
Analysis Desc: Sulfide,SM4500S-D,Aqueous	Analytical Method: SM 4500-S D							
Sulfide	0.11		mg/L	1	0.050	0.013	11/16/2020 12:35	T

CERTIFICATE OF ANALYSIS

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Advanced Environmental Laboratories, Inc.

Advanced Environmental Laboratories, Inc
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Payments: P.O. Box 551580 Jacksonville, FL 32255-1580
Phone: (407)937-1594
Fax: (407)937-1597

ANALYTICAL RESULTS

Workorder: A2008202 FPL OCEC

Lab ID: **A2008202001**
Sample ID: **1-3 HRSG Sink**

Date Received: 09/24/20 14:40 Matrix: Drinking Water
Date Collected: 09/24/20 08:05

Sample Description:

Location: J01440

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: Sulfide,SM4500S-D,Aqueous	Analytical Method: SM 4500-S D							
Sulfide	**0.013**	**U**	**mg/L**	**1**	0.050	0.013	9/25/2020 13:45	T

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Appendix C

Historical Water Usage

MONTHLY OPERATION REPORT FOR PWSs TREATING RAW GROUND WATER OR PURCHASED FINISHED WATER

See Page 4 for instructions

I. General Information for the Month/Year of: November 2021

A. Public Water System (PWS) Information

PWS Name: FP & L Okeechobee Clean Energy Cntr			PWS Identification Number: 447-4515
PWS Type: Community [ ] NonTransitent [X]	NonCommunity [ ]	Consecutive	
Number of Service Connections at End of Month:	Total Population Served at End of Month:		
PWS Owner: FP & L Okeechobee Clean Energy Center			
Contact Person: Tiffany Brady	Contact Person's Title:		
Contact Person's Mailing Address: 21505 SR 60	City: Vero Beach	State: FL	Zip Code: 32966
Contact Person's Telephone Number: 772-778-7039	Contact Person's Fax Number:		
Contact Person's Email Address: tiffany.brady@fpl.com			

B. Water Treatment Plant Information

Plant Name: WTP		Plant Telephone Number:	
Plant Address: 21505 SR 60	City: Vero Beach	State: FL	Zip Code: 32966
Type of water treated by Plant: [X] Raw Ground [ ] Purchased Finished Water			
Permitted Maximum Day Operating Capacity of Plant, gallons per day: 83420			
Plant Category (per subsection 62-699.310(4), F.A.C.): D	Plant Class (per subsection 62-699.310(4), F.A.C.): V		

Licensed Operators:	Name:	License Class	License Number	Day(s)/Shift(s) Worked
Lead/Chief Operators:	Enrique Santos	C	0025357	
Other Operators:	Bruce Jennings	C	0026337	

II. Certification by Lead/Chief Operator

I the undersigned water treatment plant operator licensed in Florida, am the lead/chief operator of the water treatment plant identified in Part 1 of this report. I certify that the information provided in this report is true and accurate to the best of my knowledge and belief. I certify that all drinking water treatment chemicals used at this plant conform to NSF International Standard 60 or other applicable standard referenced in subsection 62-555.320(3), F.A.C. I also certify that the following additional operations records for this plant were prepared each day that a licensed operator staffed or visited this plant during the month indicated above: (1) records of amounts of chemicals used and chemical feed rate, and (2) if applicable, appropriate treatment process performance records. Further more, I agree to provide these additional operations records to the PWS owner so that the PWS owner can retain them, together with copies of this report, at a convenient location for the last ten years.

Signature and Date	Printed or Typed Name	License Number
Enrique Santos 12/7/2021	Enrique Santos	C 0025357

PWS Identification Number: 447-4515

FP & L Okeechobee Clean Energy Cntr WTP

III. Daily Data for the Month/Year of: November 2021

Means of Achieving Four-Log Virus Inactivation/Removal * Free Chlorine Chlorine Dioxide Ozone Combined Chlorine (Chloramines)

UltraViolet Radiation Other (Discribe)

Type of Disinfectant Residual Maintained in Distribution System: X Free Chlorine Combined Chlorine (Chloramines) Chlorine Dioxide

Day of the Month	Days Plant Staffed or visited by operator Place "X"	Hours Plant in Operation	Net Quantity of Finished Water Produced, gal	CT Calculations, or UV Dose, to Demonstrate Four-Log Virus Inactivation, if Applicable*									Lowest Residual Disinfectant Concentration at Remote Point in Distribution System, mg/L	Emergency or Abnormal Operating Conditions; Repair or Maintenance Work that Involves Taking Water System Components Out of Operation
				CT Calculations							UV Dose			
				Peak Flow Rate, gpd	Lowest Residual Disinfectant Concentration (C) Before or at First Customer During Peak Flow, mg/L	Disinfectant Contact Time (T) at C Measurement Point During Peak Flow, minutes	Lowest CT Provided Before or at First Customer During Peak Flow, mg-min/L	Temp. of Water, °C	pH of Water, if Applicable	Minimum CT Required, mg-min/L	Lowest Operating UV Dose, mW-sec/cm^2	Minimum UV Dose Required, mW-sec/cm^2		
1	X	24	3,500		1.30								1.20	
2		24	3,500											
3	X	24	2,500		1.20								1.10	
4		24	2,500											
5	X	24	3,300		1.10								1.00	
6		24	3,300											
7		24	330											
8	X	24	3,500		1.30								1.20	
9		24	3,500											
10	X	24	4,000		1.25								1.12	
11		24	4,000											
12	X	24	3,300		0.90								0.60	
13		24	3,300											
14		24	3,300											
15	X	24	3,000		1.10								0.80	
16		24	3,000											
17	X	24	4,500		1.20								1.10	
18		24	4,500											
19	X	24	3,300		1.30								1.20	
20		24	3,300											
21		24	3,300											
22	X	24	4,000		1.20								1.10	
23		24	4,000											
24	X	24	2,000		0.80								0.56	
25		24	2,000											
26	X	24	4,000		0.78								0.65	
27		24	4,000											
28		24	4,000											
29	X	24	3,500		1.10								1.00	
30		24	3,300											
31														

Total	99,530
Average	3,318
Maximum	4,500

MONTHLY OPERATION REPORT FOR PWSs TREATING RAW GROUND WATER OR PURCHASED FINISHED WATER

See Page 4 for instructions

I. General Information for the Month/Year of: December 2021

A. Public Water System (PWS) Information

PWS Name: FP & L Okeechobee Clean Energy Cntr			PWS Identification Number: 447-4515
PWS Type: Community [ ] NonTransitent [X]	NonCommunity [ ]	Consecutive	
Number of Service Connections at End of Month:	Total Population Served at End of Month:		
PWS Owner: FP & L Okeechobee Clean Energy Center			
Contact Person: Tiffany Brady	Contact Person's Title:		
Contact Person's Mailing Address: 21505 SR 60	City: Vero Beach	State: FL	Zip Code: 32966
Contact Person's Telephone Number: 772-778-7039	Contact Person's Fax Number:		
Contact Person's Email Address: tiffany.brady@fpl.com			

B. Water Treatment Plant Information

Plant Name: WTP		Plant Telephone Number:	
Plant Address: 21505 SR 60	City: Vero Beach	State: FL	Zip Code: 32966
Type of water treated by Plant: [X] Raw Ground [ ] Purchased Finished Water			
Permitted Maximum Day Operating Capacity of Plant, gallons per day: 83420			
Plant Category (per subsection 62-699.310(4), F.A.C.): D	Plant Class (per subsection 62-699.310(4), F.A.C.): V		

Licensed Operators:	Name:	License Class	License Number	Day(s)/Shift(s) Worked
Lead/Chief Operators:	Enrique Santos	C	0025357	
Other Operators:	Bruce Jennings	C	0026337	

II. Certification by Lead/Chief Operator

I the undersigned water treatment plant operator licensed in Florida, am the lead/chief operator of the water treatment plant identified in Part 1 of this report. I certify that the information provided in this report is true and accurate to the best of my knowledge and belief. I certify that all drinking water treatment chemicals used at this plant conform to NSF International Standard 60 or other applicable standard referenced in subsection 62-555.320(3), F.A.C. I also certify that the following additional operations records for this plant were prepared each day that a licensed operator staffed or visited this plant during the month indicated above: (1) records of amounts of chemicals used and chemical feed rate, and (2) if applicable, appropriate treatment process performance records. Further more, I agree to provide these additional operations records to the PWS owner so that the PWS owner can retain them, together with copies of this report, at a convenient location for the last ten years.

Enrique Santos 1/3/2022	Enrique Santos	C 0025357
Signature and Date	Printed or Typed Name	License Number

PWS Identification Number: 447-4515	Plant Name: FP & L Okeechobee Clean Energy Cntr

IV. Summary of Use of Polymer Containing Acrylamide, Polymer Containing Epichlorohydrin, and Iron or Manganese Sequestrant for the Year: *

A. Is any polymer containing the monomer acrylamide used at the water treatment plant? [X] No [ ] Yes and the polymer dose and the acrylamide level in the polymer are as f

Polymer Dose, ppm =	Acrylamide Level, %†

B. Is any polymer containing the monomer epichlorohydrin used at the water treatment plant? [X] No [ ] Yes and the polymer dose and the epichlorohydrin level in the polymer are as follows:

Polymer Dose, ppm =	Epichlorohydrin Level, %† =

C. Is any iron or manganese sequestrant used at the water treatment plant? [X] No [ ] Yes and the type of sequestrant, sequestrant dose, etc., are as follows:

Type of Sequestrant (polyphosphate or sodium silicate)
Sequestrant Dose, mg/L of phosphate as PO4 or mg/L of silicate as SiO2 =
If sodium silicate is used, the amount of added plus naturally occurring silicate, in mg/L as SiO2 =

**Complete and submit Part IV of this report only with the monthly operation report for December of each year and only for water treatment plants using polymer containing acrylamide, polymer containing epichlorohydrin, and/or an iron and manganese sequestrant.*

†Acrylamide and epichlorohydrin levels may be based on the polymer manufacturer's certification or on third-party certification.

PWS Identification Number: 447-4515

FP & L Okeechobee Clean Energy Cntr WTP

III. Daily Data for the Month/Year of: December 2021

Means of Achieving Four-Log Virus Inactivation/Removal * Free Chlorine Chlorine Dioxide Ozone Combined Chlorine (Chloramines)

UltraViolet Radiation Other (Discribe)

Type of Disinfectant Residual Maintained in Distribution System: X Free Chlorine Combined Chlorine (Chloramines) Chlorine Dioxide

Day of the Month	Days Plant Staffed or visited by operator Place "X"	Hours Plant in Operation	Net Quantity of Finished Water Produced, gal	CT Calculations, or UV Dose, to Demonstrate Four-Log Virus Inactivation, if Applicable*									Lowest Residual Disinfectant Concentration at Remote Point in Distribution System, mg/L	Emergency or Abnormal Operating Conditions; Repair or Maintenance Work that Involves Taking Water System Components Out of Operation
				CT Calculations							UV Dose			
				Peak Flow Rate, gpd	Lowest Residual Disinfectant Concentration (C) Before or at First Customer During Peak Flow, mg/L	Disinfectant Contact Time (T) at C Measurement Point During Peak Flow, minutes	Lowest CT Provided Before or at First Customer During Peak Flow, mg-min/L	Temp. of Water, °C	pH of Water, if Applicable	Minimum CT Required, mg-min/L	Lowest Operating UV Dose, mW-sec/cm^2	Minimum UV Dose Required, mW-sec/cm^2		
1	X	24	3,000		1.29								1.10	
2		24	3,000											
3	X	24	4,000		0.60								0.40	
4		24	4,000											
5		24	4,000											
6	X	24	2,000		0.60								0.30	
7		24	2,000											
8	X	24	4,500		0.70								0.50	
9		24	4,500											
10	X	24	4,300		0.80								0.60	
11		24	4,300											
12		24	4,300											
13	X	24	4,000		1.20								1.00	
14		24	4,000											
15	X	24	3,500		0.80								0.60	
16		24	3,500											
17	X	24	3,300		1.10								0.70	
18		24	3,300											
19		24	330											
20	X	24	4,000		0.60								0.30	
21		24	4,000											
22	X	24	4,000		1.30								1.10	
23		24	4,000											
24	X	24	3,300		1.10								0.90	
25		24	3,300											
26		24	3,300											
27	X	24	3,500		1.12								0.91	
28		24	3,500											
29	X	24	3,500		1.00								0.85	
30		24	3,500											
31	X	24	3,000		1.20								0.98	

Total	108,730
Average	3,507
Maximum	4,500

MONTHLY OPERATION REPORT FOR PWSs TREATING RAW GROUND WATER OR PURCHASED FINISHED WATER

See Page 4 for instructions

I. General Information for the Month/Year of: January 2022

A. Public Water System (PWS) Information

PWS Name: FP & L Okeechobee Clean Energy Cntr			PWS Identification Number: 447-4515
PWS Type: Community [ ] NonTransitent [X]	NonCommunity [ ] Consecutive		
Number of Service Connections at End of Month:	Total Population Served at End of Month:		
PWS Owner: FP & L Okeechobee Clean Energy Center			
Contact Person: Tiffany Brady	Contact Person's Title:		
Contact Person's Mailing Address: 21505 SR 60	City: Vero Beach	State: FL	Zip Code: 32966
Contact Person's Telephone Number: 772-778-7039	Contact Person's Fax Number:		
Contact Person's Email Address: tiffany.brady@fpl.com			

B. Water Treatment Plant Information

Plant Name: WTP		Plant Telephone Number:	
Plant Address: 21505 SR 60	City: Vero Beach	State: FL	Zip Code: 32966
Type of water treated by Plant: [X] Raw Ground [ ] Purchased Finished Water			
Permitted Maximum Day Operating Capacity of Plant, gallons per day: 83420			
Plant Category (per subsection 62-699.310(4), F.A.C.): D	Plant Class (per subsection 62-699.310(4), F.A.C.): V		

Licensed Operators:	Name:	License Class	License Number	Day(s)/Shift(s) Worked
Lead/Chief Operators:	Enrique Santos	C	0025357	
Other Operators:	Bruce Jennings	C	0026337	

II. Certification by Lead/Chief Operator

I the undersigned water treatment plant operator licensed in Florida, am the lead/chief operator of the water treatment plant identified in Part 1 of this report. I certify that the information provided in this report is true and accurate to the best of my knowledge and belief. I certify that all drinking water treatment chemicals used at this plant conform to NSF International Standard 60 or other applicable standard referenced in subsection 62-555.320(3), F.A.C. I also certify that the following additional operations records for this plant were prepared each day that a licensed operator staffed or visited this plant during the month indicated above: (1) records of amounts of chemicals used and chemical feed rate, and (2) if applicable, appropriate treatment process performance records. Further more, I agree to provide these additional operations records to the PWS owner so that the PWS owner can retain them, together with copies of this report, at a convenient location for the last ten years.

Signature and Date	Printed or Typed Name	License Number
Enrique Santos 2/1/2022	Enrique Santos	C 0025357

PWS Identification Number: 447-4515

FP & L Okeechobee Clean Energy Cntr WTP

III. Daily Data for the Month/Year of: January 2022

Means of Achieving Four-Log Virus Inactivation/Removal * Free Chlorine Chlorine Dioxide Ozone Combined Chlorine (Chloramines)

UltraViolet Radiation Other (Discribe)

Type of Disinfectant Residual Maintained in Distribution System: X Free Chlorine Combined Chlorine (Chloramines) Chlorine Dioxide

Day of the Month	Days Plant Staffed or visited by operator Place "X"	Hours Plant in Operation	Net Quantity of Finished Water Produced, gal	CT Calculations, or UV Dose, to Demonstrate Four-Log Virus Inactivation, if Applicable*									Lowest Residual Disinfectant Concentration at Remote Point in Distribution System, mg/L	Emergency or Abnormal Operating Conditions; Repair or Maintenance Work that Involves Taking Water System Components Out of Operation
				CT Calculations							UV Dose			
				Peak Flow Rate, gpd	Lowest Residual Disinfectant Concentration (C) Before or at First Customer During Peak Flow, mg/L	Disinfectant Contact Time (T) at C Measurement Point During Peak Flow, minutes	Lowest CT Provided Before or at First Customer During Peak Flow, mg-min/L	Temp. of Water, °C	pH of Water, if Applicable	Minimum CT Required, mg-min/L	Lowest Operating UV Dose, mW-sec/cm^2	Minimum UV Dose Required, mW-sec/cm^2		
1		24	3,700											
2		24	3,700											
3	X	24	5,500		1.30								1.10	
4		24	5,500											
5	X	24	3,500		1.20								1.00	
6		24	3,500											
7	X	24	4,700		2.00								1.50	
8		24	4,700											
9		24	4,700											
10	X	24	5,500		1.50								1.30	
11		24	5,500											
12	X	24	5,000		1.20								1.10	
13		24	5,000											
14	X	24	2,300		0.80								0.40	
15		24	2,300											
16		24	2,300											
17	X	24	3,500		0.82								0.62	
18		24	3,500											
19	X	24	5,500		1.20								1.10	
20		24	5,500											
21	X	24	5,000		1.30								1.10	
22		24	5,000											
23		24	5,000											
24	X	24	4,000		1.20								1.00	
25		24	4,000											
26	X	24	3,000		1.00								0.70	
27		24	3,000											
28	X	24	4,300		1.10								0.80	
29		24	4,300											
30		24	4,300											
31	X	24	5,000		1.22								1.00	

Total	132,300
Average	4,268
Maximum	5,500

MONTHLY OPERATION REPORT FOR PWSs TREATING RAW GROUND WATER OR PURCHASED FINISHED WATER

See Page 4 for instructions

I. General Information for the Month/Year of: February 2022

A. Public Water System (PWS) Information

PWS Name: FP & L Okeechobee Clean Energy Cntr			PWS Identification Number: 447-4515
PWS Type: Community [ ] NonTransitent [X]	NonCommunity [ ] Consecutive		
Number of Service Connections at End of Month: 21	Total Population Served at End of Month: 50		
PWS Owner: FP & L Okeechobee Clean Energy Center			
Contact Person: Tiffany Brady	Contact Person's Title:		
Contact Person's Mailing Address: 21505 SR 60	City: Vero Beach	State: FL	Zip Code: 32966
Contact Person's Telephone Number: 772-778-7039	Contact Person's Fax Number:		
Contact Person's Email Address: tiffany.brady@fpl.com			

B. Water Treatment Plant Information

Plant Name: WTP		Plant Telephone Number:	
Plant Address: 21505 SR 60	City: Vero Beach	State: FL	Zip Code: 32966
Type of water treated by Plant: [X] Raw Ground [ ] Purchased Finished Water			
Permitted Maximum Day Operating Capacity of Plant, gallons per day: 83420			
Plant Category (per subsection 62-699.310(4), F.A.C.): D	Plant Class (per subsection 62-699.310(4), F.A.C.): V		

Licensed Operators:	Name:	License Class	License Number	Day(s)/Shift(s) Worked
Lead/Chief Operators:	Enrique Santos	C	0025357	
Other Operators:	Bruce Jennings	C	0026337	

II. Certification by Lead/Chief Operator

I the undersigned water treatment plant operator licensed in Florida, am the lead/chief operator of the water treatment plant identified in Part 1 of this report. I certify that the information provided in this report is true and accurate to the best of my knowledge and belief. I certify that all drinking water treatment chemicals used at this plant conform to NSF International Standard 60 or other applicable standard referenced in subsection 62-555.320(3), F.A.C. I also certify that the following additional operations records for this plant were prepared each day that a licensed operator staffed or visited this plant during the month indicated above: (1) records of amounts of chemicals used and chemical feed rate, and (2) if applicable, appropriate treatment process performance records. Further more, I agree to provide these additional operations records to the PWS owner so that the PWS owner can retain them, together with copies of this report, at a convenient location for the last ten years.

Enrique Santos 3/4/2022	Enrique Santos	C 0025357
Signature and Date	Printed or Typed Name	License Number

PWS Identification Number: 447-4515

FP & L Okeechobee Clean Energy Cntr WTP

III. Daily Data for the Month/Year of: February 2022

Means of Achieving Four-Log Virus Inactivation/Removal * Free Chlorine Chlorine Dioxide Ozone Combined Chlorine (Chloramines)

UltraViolet Radiation Other (Discribe)

Type of Disinfectant Residual Maintained in Distribution System: X Free Chlorine Combined Chlorine (Chloramines) Chlorine Dioxide

Day of the Month	Days Plant Staffed or visited by operator Place "X"	Hours Plant in Operation	Net Quantity of Finished Water Produced, gal	CT Calculations, or UV Dose, to Demonstrate Four-Log Virus Inactivation, if Applicable*									Lowest Residual Disinfectant Concentration at Remote Point in Distribution System, mg/L	Emergency or Abnormal Operating Conditions; Repair or Maintenance Work that Involves Taking Water System Components Out of Operation
				CT Calculations							UV Dose			
				Peak Flow Rate, gpd	Lowest Residual Disinfectant Concentration (C) Before or at First Customer During Peak Flow, mg/L	Disinfectant Contact Time (T) at C Measurement Point During Peak Flow, minutes	Lowest CT Provided Before or at First Customer During Peak Flow, mg-min/L	Temp. of Water, °C	pH of Water, if Applicable	Minimum CT Required, mg-min/L	Lowest Operating UV Dose, mW-sec/cm^2	Minimum UV Dose Required, mW-sec/cm^2		
1		24	3,300											
2	X	24	4,000		1.10								0.95	
3		24	4,500											
4	X	24	4,000		1.00								0.75	
5		24	4,000											
6		24	4,000											
7	X	24	3,500		1.10								0.80	
8		24	3,500											
9	X	24	4,500		1.20								0.95	
10		24	4,500											
11	X	24	4,300		1.00								0.90	
12		24	4,300											
13		24	4,300											
14	X	24	4,000		1.30								0.98	
15		24	4,000											
16	X	24	4,000		1.20								1.10	
17		24	4,000											
18	X	24	4,000		1.10								0.80	
19		24	4,000											
20		24	4,000											
21	X	24	55,000		0.90								0.60	
22		24	55,000											
23	X	24	4,000		1.00								0.70	
24		24	4,000											
25	X	24	4,000		0.90								0.50	
26		24	4,000											
27		24	4,000											
28	X	24	7,804		0.80								0.70	
29														
30														
31														

Total	218,504
Average	7,804
Maximum	55,000

MONTHLY OPERATION REPORT FOR PWSs TREATING RAW GROUND WATER OR PURCHASED FINISHED WATER

See Page 4 for instructions

I. General Information for the Month/Year of: March 2022

A. Public Water System (PWS) Information

PWS Name: FP & L Okeechobee Clean Energy Cntr			PWS Identification Number: 447-4515
PWS Type: Community [ ] NonTransitent [X]	NonCommunity [ ] Consecutive		
Number of Service Connections at End of Month: 21	Total Population Served at End of Month: 50		
PWS Owner: FP & L Okeechobee Clean Energy Center			
Contact Person: Tiffany Brady	Contact Person's Title:		
Contact Person's Mailing Address: 21505 SR 60	City: Vero Beach	State: FL	Zip Code: 32966
Contact Person's Telephone Number: 772-778-7039	Contact Person's Fax Number:		
Contact Person's Email Address: tiffany.brady@fpl.com			

B. Water Treatment Plant Information

Plant Name: WTP		Plant Telephone Number:	
Plant Address: 21505 SR 60	City: Vero Beach	State: FL	Zip Code: 32966
Type of water treated by Plant: [X] Raw Ground [ ] Purchased Finished Water			
Permitted Maximum Day Operating Capacity of Plant, gallons per day: 83420			
Plant Category (per subsection 62-699.310(4), F.A.C.): D	Plant Class (per subsection 62-699.310(4), F.A.C.): V		

Licensed Operators:	Name:	License Class	License Number	Day(s)/Shift(s) Worked
Lead/Chief Operators:	Thomas Isaac	C	27306	
Other Operators:	Bruce Jennings	C	0026337	

II. Certification by Lead/Chief Operator

I the undersigned water treatment plant operator licensed in Florida, am the lead/chief operator of the water treatment plant identified in Part 1 of this report. I certify that the information provided in this report is true and accurate to the best of my knowledge and belief. I certify that all drinking water treatment chemicals used at this plant conform to NSF International Standard 60 or other applicable standard referenced in subsection 62-555.320(3), F.A.C. I also certify that the following additional operations records for this plant were prepared each day that a licensed operator staffed or visited this plant during the month indicated above: (1) records of amounts of chemicals used and chemical feed rate, and (2) if applicable, appropriate treatment process performance records. Further more, I agree to provide these additional operations records to the PWS owner so that the PWS owner can retain them, together with copies of this report, at a convenient location for the last ten years.

Signature and Date	Printed or Typed Name	License Number
Thomas Isaac 4/5/2022	Thomas Isaac	C 27306

PWS Identification Number: 447-4515

FP & L Okeechobee Clean Energy Cntr WTP

III. Daily Data for the Month/Year of: March 2022

Means of Achieving Four-Log Virus Inactivation/Removal * Free Chlorine Chlorine Dioxide Ozone Combined Chlorine (Chloramines)

UltraViolet Radiation Other (Discribe)

Type of Disinfectant Residual Maintained in Distribution System: X Free Chlorine Combined Chlorine (Chloramines) Chlorine Dioxide

Day of the Month	Days Plant Staffed or visited by operator Place "X"	Hours Plant in Operation	Net Quantity of Finished Water Produced, gal	CT Calculations, or UV Dose, to Demonstrate Four-Log Virus Inactivation, if Applicable*									Lowest Residual Disinfectant Concentration at Remote Point in Distribution System, mg/L	Emergency or Abnormal Operating Conditions; Repair or Maintenance Work that Involves Taking Water System Components Out of Operation
				CT Calculations							UV Dose			
				Peak Flow Rate, gpd	Lowest Residual Disinfectant Concentration (C) Before or at First Customer During Peak Flow, mg/L	Disinfectant Contact Time (T) at C Measurement Point During Peak Flow, minutes	Lowest CT Provided Before or at First Customer During Peak Flow, mg-min/L	Temp. of Water, °C	pH of Water, if Applicable	Minimum CT Required, mg-min/L	Lowest Operating UV Dose, mW-sec/cm^2	Minimum UV Dose Required, mW-sec/cm^2		
1		24	12,586											
2	X	24	45,000		0.90								0.55	
3		24	45,000											
4	X	24	43,300		1.00								0.60	
5		24	43,300											
6		24	43,300											
7	X	24	45,000		1.00								0.68	
8		24	4,500											
9	X	24	4,500		0.93								0.56	
10		24	4,500											
11	X	24	4,333		0.95								0.61	
12		24	4,333											
13		24	4,333											
14	X	24	3,500		0.91								0.60	
15		24	3,500											
16	X	24	5,000		0.92								0.61	
17		24	5,000											
18	X	24	3,666		0.99								0.68	
19		24	3,666											
20		24	3,666											
21	X	24	4,000		0.90								0.59	
22		24	4,000											
23	X	24	4,000		0.80								0.50	
24		24	4,000											
25	X	24	2,667		0.90								0.50	
26		24	2,667											
27		24	2,667											
28	X	24	4,500		1.00								0.60	
29		24	4,500											
30	X	24	12,586		0.90								0.60	
31		24	12,586											

Total	390,156
Average	12,586
Maximum	45,000

MONTHLY OPERATION REPORT FOR PWSs TREATING RAW GROUND WATER OR PURCHASED FINISHED WATER

See last page for instructions.

I. General Information for the Month/Year of: April-22

A. Public Water System (PWS) Information

PWS Name:	**FPL Clean Energy Center**		PWS Identification Number	**4474515**
PWS Type:	[ ]Community	[X]Non-Transient Non-Community	[ ]Transient Non-Community	[ ]Consecutive
Number of Service Connections at End of Month:			Total Population Served at End of Month:	
PWS Owner:	FPL Clean Energy Center			
Contact Person:	Tiffany Brady		Contact Person's Title:	
Contact Person's Mailing Address:	21505 SR 60	City: Vero Beach	State: FL	Zip Code: 32966
Contact Person's Telephone Number:	772-778-7039		Contact Person's Fax Number:	
Contact Person's E-Mail Address:	tiffany.brady@fpl.com			

B. Water Treatment Plant Information

Plant Name:	**FPL Clean Energy Center**		Plant Telephone	
Plant Address:	21505 SR 60	City: Vero Beach	State: FL	Zip Code: 32966
Type of Water Treated by Plant:	[X] Raw Ground Water	[ ] Purchased Finished Water		
Permitted Maximum Day Operating Capacity of Plant,				
Plant Category (per subsection 62-699.310(4),	V	Plant Class (per subsection 62-699.310(4), F.A.C.):	D	

Licensed Operators	Name	License Number	License Class	Day(s)/Shift(s) Worked
Lead/Chief Operator:	Kevin R. Rogers	8379	A	three non-consecutive visits per week
Other Operators:				

II. Certification by Lead/Chief Operator

I, the undersigned water treatment plant operator licensed in Florida, am the lead/chief operator of the water treatment plant identified in Part I of this report. I certify that the information provided in this report is true and accurate to the best of my knowledge and belief. I certify that all drinking water treatment chemicals used at this plant conform to NSF International Standard 60 or other applicable standards referenced in subsection 62-555.320(3), F.A.C. I also certify that the following additional operations records for this plant were prepared each day that a licensed operator staffed or visited this plant during the month indicated above: (1) records of amounts of chemicals used and chemical feed rates; and (2) if applicable, appropriate treatment process performance records. Furthermore, I agree to provide these additional operations records to the PWS owner so the PWS owner can retain them, together with copies of this report, at a convenient location for at least ten years.



5/3/2022	Kevin R. Rogers	8379-A
Signature and Date	Printed or Typed Name	License Number

MONTHLY OPERATION REPORT FOR PWSs TREATING RAW GROUND WATER OR PURCHASED FINISHED WATER

PWS Identification Number: **4474515** | Plant Name: **FPL Clean Energy Center**

III. Daily Data for the Month/Year of: **April 2022**

Means of Achieving Four-Log Virus [ ]Free Chlorine [ ]Chlorine Dioxide [ ]Ozone [ ]Combined Chlorine (Chloramines) [ ]Ultraviolet Radiation [ ]Other:

Type of Disinfectant Residual Maintained in [X]Free Chlorine [ ]Combined Chlorine (Chloramines) [ ]Chlorine Dioxide

Day of the Month	Days Plant Staffed or Visited by Operator (Place "X")	Hours Plant in Operation	Net Quantity of Finished Water Produced, gal	CT Calculations, or UV Dose, to Demonstrate Four-Log Virus Inactivation, if Applicable*									Lowest Residual Disinfectant Concentration at Remote Point in Distribution System, mg/L	Emergency or Abnormal Operating Conditions; Repair or Maintenance Work that Involves Taking Water System Components Out of Operation
				CT Calculations							UV Dose			
				Peak Flow Rate, gpd	Disinfectant Concentration (C) Before or at First Customer During Peak Flow, mg/L	Disinfectant Contact Time (T) at C Measurement Point During Peak Flow, minutes	mg-min/L	Temp. of Water, °C	pH of Water, if Applicable	Minimum CT Required, mg-min/L	Lowest Operating UV Dose, mW-sec/cm^2	Minimum UV Dose Required, mW-sec/cm^2		
1	x	24	3,000										0.2	First Visit
2		24	3,000											
3		24	3,000											
4	x	24	3,000										0.5	
5		24	4,000											
6	x	24	4,000										0.4	
7		24	3,500											
8	x	24	3,500										0.2	
9		24	4,300											
10		24	4,300											
11	x	24	4,300										0.3	
12		24	3,000											
13	x	24	3,000										0.8	
14		24	4,500											
15	x	24	4,500										0.2	
16		24	4,300											
17		24	4,300											
18	x	24	4,300										**0.0**	boil water notice flow switch bad
19		24	**8,500**											
20	x	24	**8,500**										**0.0**	
21		24	2,000											
22	x	24	2,000										**0.0**	Replace switch work on saddle
23		24	3,700											
24		24	3,700											
25	x	24	3,700										2.5	
26		24	5,500											
27	x	24	5,500										0.2	boil water lifted both bact clear
28		24	3,500											
29	x	24	3,500										1.0	
30		24	2,300											
31														
Total			120,200											
Average			**4,007**											
Maximum			**8,500**											

* Refer to the instructions for this report to determine which plants must provide this information.

LOWEST RESIDUAL 0.0 days checked by operator 13

DAYS IN MONTH 30

MONTHLY OPERATION REPORT FOR PWSs TREATING RAW GROUND WATER OR PURCHASED FINISHED WATER

See last page for instructions.

I. General Information for the Month/Year of: May-22

A. Public Water System (PWS) Information

PWS Name:	**FPL Clean Energy Center**		PWS Identification Number	**4474515**
PWS Type:	[ ]Community	[X]Non-Transient Non-Community	[ ]Transient Non-Community	[ ]Consecutive
Number of Service Connections at End of Month:			Total Population Served at End of Month:	
PWS Owner:	FPL Clean Energy Center			
Contact Person:	Tiffany Brady		Contact Person's Title:	
Contact Person's Mailing Address:	21505 SR 60	City: Vero Beach	State: FL	Zip Code: 32966
Contact Person's Telephone Number:	772-778-7039		Contact Person's Fax Number:	
Contact Person's E-Mail Address:	tiffany.brady@fpl.com			

B. Water Treatment Plant Information

Plant Name:	**FPL Clean Energy Center**		Plant Telephone	
Plant Address:	21505 SR 60	City: Vero Beach	State: FL	Zip Code: 32966
Type of Water Treated by Plant:	[X] Raw Ground Water	[ ] Purchased Finished Water		
Permitted Maximum Day Operating Capacity of Plant,				
Plant Category (per subsection 62-699.310(4),	V	Plant Class (per subsection 62-699.310(4), F.A.C.):	D	

Licensed Operators	Name	License Number	License Class	Day(s)/Shift(s) Worked
Lead/Chief Operator:	Kevin R. Rogers	8379	A	three non-consecutive visits per week
Other Operators:				

II. Certification by Lead/Chief Operator

I, the undersigned water treatment plant operator licensed in Florida, am the lead/chief operator of the water treatment plant identified in Part I of this report. I certify that the information provided in this report is true and accurate to the best of my knowledge and belief. I certify that all drinking water treatment chemicals used at this plant conform to NSF International Standard 60 or other applicable standards referenced in subsection 62-555.320(3), F.A.C. I also certify that the following additional operations records for this plant were prepared each day that a licensed operator staffed or visited this plant during the month indicated above: (1) records of amounts of chemicals used and chemical feed rates; and (2) if applicable, appropriate treatment process performance records. Furthermore, I agree to provide these additional operations records to the PWS owner so the PWS owner can retain them, together with copies of this report, at a convenient location for at least ten years.



6/1/2022	Kevin R. Rogers	8379-A
Signature and Date	Printed or Typed Name	License Number

MONTHLY OPERATION REPORT FOR PWSs TREATING RAW GROUND WATER OR PURCHASED FINISHED WATER

PWS Identification Number: **4474515** | Plant Name: **FPL Clean Energy Center**

III. Daily Data for the Month/Year of: **May 2022**

Means of Achieving Four-Log Virus: [ ]Free Chlorine [ ]Chlorine Dioxide [ ]Ozone [ ]Combined Chlorine (Chloramines) [ ]Ultraviolet Radiation [ ]Other:

Type of Disinfectant Residual Maintained in: [X]Free Chlorine [ ]Combined Chlorine (Chloramines) [ ]Chlorine Dioxide

Day of the Month	Days Plant Staffed or Visited by Operator (Place "X")	Hours Plant in Operation	Net Quantity of Finished Water Produced, gal	CT Calculations, or UV Dose, to Demonstrate Four-Log Virus Inactivation, if Applicable*									Lowest Residual Disinfectant Concentration at Remote Point in Distribution System, mg/L	Emergency or Abnormal Operating Conditions; Repair or Maintenance Work that Involves Taking Water System Components Out of Operation
				CT Calculations							UV Dose			
				Peak Flow Rate, gpd	Disinfectant Concentration (C) Before or at First Customer During Peak Flow, mg/L	Disinfectant Contact Time (T) at C Measurement Point During Peak Flow, minutes	mg-min/L	Temp. of Water, °C	pH of Water, if Applicable	Minimum CT Required, mg-min/L	Lowest Operating UV Dose, mW-sec/cm^2	Minimum UV Dose Required, mW-sec/cm^2		
1		24	2,300											
2	x	24	2,300										0.6	
3		24	**7,000**											
4	x	24	**7,000**										0.5	
5		24	4,000											
6	x	24	4,000										0.8	
7		24	4,700											
8		24	4,700											
9	x	24	4,700										0.3	
10		24	3,500											
11	x	24	3,500										0.3	
12		24	3,500											
13	x	24	3,500										0.2	
14		24	4,000											
15		24	4,000											
16	x	24	4,000										0.3	
17		24	4,000											
18	x	24	4,000										**0.0**	Flow switch bad, boil water
19		24	3,500											
20	x	24	3,500										**0.0**	
21		24	3,000											
22		24	3,000											
23	x	24	3,000										**0.0**	
24		24	4,500											
25	x	24	4,500										**0.0**	
26		24	3,000											
27	x	24	3,000										0.3	
28		24	4,000											
29		24	4,000											
30	x	24	4,000										0.5	
31		24	2,500											
Total			120,200											
Average			**3,877**											
Maximum			**7,000**											

* Refer to the instructions for this report to determine which plants must provide this information.

LOWEST RESIDUAL 0.0 days checked by operator 13

DAYS IN MONTH 31

MONTHLY OPERATION REPORT FOR PWSs TREATING RAW GROUND WATER OR PURCHASED FINISHED WATER

See last page for instructions.

I. General Information for the Month/Year of: June-22

A. Public Water System (PWS) Information

PWS Name:	**FPL Clean Energy Center**		PWS Identification Number	**4474515**
PWS Type:	[ ]Community	[X]Non-Transient Non-Community	[ ]Transient Non-Community	[ ]Consecutive
Number of Service Connections at End of Month:			Total Population Served at End of Month:	
PWS Owner:	FPL Clean Energy Center			
Contact Person:	Tiffany Brady		Contact Person's Title:	
Contact Person's Mailing Address:	21505 SR 60	City: Vero Beach	State: FL	Zip Code: 32966
Contact Person's Telephone Number:	772-778-7039		Contact Person's Fax Number:	
Contact Person's E-Mail Address:	tiffany.brady@fpl.com			

B. Water Treatment Plant Information

Plant Name:	**FPL Clean Energy Center**		Plant Telephone	
Plant Address:	21505 SR 60	City: Vero Beach	State: FL	Zip Code: 32966
Type of Water Treated by Plant:	[X] Raw Ground Water	[ ] Purchased Finished Water		
Permitted Maximum Day Operating Capacity of Plant,				
Plant Category (per subsection 62-699.310(4),	V	Plant Class (per subsection 62-699.310(4), F.A.C.):	D	

Licensed Operators	Name	License Number	License Class	Day(s)/Shift(s) Worked
Lead/Chief Operator:	Kevin R. Rogers	8379	A	three non-consecutive visits per week
Other Operators:				

II. Certification by Lead/Chief Operator

I, the undersigned water treatment plant operator licensed in Florida, am the lead/chief operator of the water treatment plant identified in Part I of this report. I certify that the information provided in this report is true and accurate to the best of my knowledge and belief. I certify that all drinking water treatment chemicals used at this plant conform to NSF International Standard 60 or other applicable standards referenced in subsection 62-555.320(3), F.A.C. I also certify that the following additional operations records for this plant were prepared each day that a licensed operator staffed or visited this plant during the month indicated above: (1) records of amounts of chemicals used and chemical feed rates; and (2) if applicable, appropriate treatment process performance records. Furthermore, I agree to provide these additional operations records to the PWS owner so the PWS owner can retain them, together with copies of this report, at a convenient location for at least ten years.



7/5/2022	Kevin R. Rogers	8379-A
Signature and Date	Printed or Typed Name	License Number

MONTHLY OPERATION REPORT FOR PWSs TREATING RAW GROUND WATER OR PURCHASED FINISHED WATER

PWS Identification Number: **4474515** | Plant Name: **FPL Clean Energy Center**

III. Daily Data for the Month/Year of: **June 2022**

Means of Achieving Four-Log Virus: [ ]Free Chlorine [ ]Chlorine Dioxide [ ]Ozone [ ]Combined Chlorine (Chloramines) [ ]Ultraviolet Radiation [ ]Other:

Type of Disinfectant Residual Maintained in: [X]Free Chlorine [ ]Combined Chlorine (Chloramines) [ ]Chlorine Dioxide

Day of the Month	Days Plant Staffed or Visited by Operator (Place "X")	Hours Plant in Operation	Net Quantity of Finished Water Produced, gal	CT Calculations, or UV Dose, to Demonstrate Four-Log Virus Inactivation, if Applicable*									Lowest Residual Disinfectant Concentration at Remote Point in Distribution System, mg/L	Emergency or Abnormal Operating Conditions; Repair or Maintenance Work that Involves Taking Water System Components Out of Operation
				CT Calculations							UV Dose			
				Peak Flow Rate, gpd	Disinfectant Concentration (C) Before or at First Customer During Peak Flow, mg/L	Disinfectant Contact Time (T) at C Measurement Point During Peak Flow, minutes	mg-min/L	Temp. of Water, °C	pH of Water, if Applicable	Minimum CT Required, mg-min/L	Lowest Operating UV Dose, mW-sec/cm^2	Minimum UV Dose Required, mW-sec/cm^2		
1	x	24	2,500										3.5	
2		24	4,500											
3	x	24	4,500										1.5	
4		24	4,000											
5		24	4,000											
6	x	24	4,000										0.3	
7		24	3,500											
8	x	24	3,500										0.4	
9		24	3,000											
10	x	24	3,000										1.0	
11		24	4,300											
12		24	4,300											
13	x	24	4,300										0.3	
14		24	3,500											
15	x	24	3,500										0.3	
16		24	4,000											
17	x	24	4,000										0.2	
18		24	3,000											
19		24	3,000											
20	x	24	3,000										0.2	
21		24	3,500											
22	x	24	3,500										0.2	
23		24	3,500											
24	x	24	3,500										0.6	
25		24	3,700											
26		24	3,700											
27	x	24	3,700										0.7	
28		24	4,000											
29	x	24	4,000										0.4	
30		24	2,500											
31														
Total			109,000											
Average			**3,633**											
Maximum			**4,500**											

* Refer to the instructions for this report to determine which plants must provide this information.

LOWEST RESIDUAL 0.2 days checked by operator 13

DAYS IN MONTH 30

MONTHLY OPERATION REPORT FOR PWSs TREATING RAW GROUND WATER OR PURCHASED FINISHED WATER

See last page for instructions.

I. General Information for the Month/Year of: July-22

A. Public Water System (PWS) Information

PWS Name:	**FPL Clean Energy Center**		PWS Identification Number	**4474515**
PWS Type:	[ ]Community	[X]Non-Transient Non-Community	[ ]Transient Non-Community	[ ]Consecutive
Number of Service Connections at End of Month:			Total Population Served at End of Month:	
PWS Owner:	FPL Clean Energy Center			
Contact Person:	Tiffany Brady		Contact Person's Title:	
Contact Person's Mailing Address:	21505 SR 60	City: Vero Beach	State: FL	Zip Code: 32966
Contact Person's Telephone Number:	772-778-7039		Contact Person's Fax Number:	
Contact Person's E-Mail Address:	tiffany.brady@fpl.com			

B. Water Treatment Plant Information

Plant Name:	**FPL Clean Energy Center**		Plant Telephone	
Plant Address:	21505 SR 60	City: Vero Beach	State: FL	Zip Code: 32966
Type of Water Treated by Plant:	[X] Raw Ground Water	[ ] Purchased Finished Water		
Permitted Maximum Day Operating Capacity of Plant,				
Plant Category (per subsection 62-699.310(4),	V	Plant Class (per subsection 62-699.310(4), F.A.C.):	D	

Licensed Operators	Name	License Number	License Class	Day(s)/Shift(s) Worked
Lead/Chief Operator:	Kevin R. Rogers	8379	A	three non-consecutive visits per week
Other Operators:				

II. Certification by Lead/Chief Operator

I, the undersigned water treatment plant operator licensed in Florida, am the lead/chief operator of the water treatment plant identified in Part I of this report. I certify that the information provided in this report is true and accurate to the best of my knowledge and belief. I certify that all drinking water treatment chemicals used at this plant conform to NSF International Standard 60 or other applicable standards referenced in subsection 62-555.320(3), F.A.C. I also certify that the following additional operations records for this plant were prepared each day that a licensed operator staffed or visited this plant during the month indicated above: (1) records of amounts of chemicals used and chemical feed rates; and (2) if applicable, appropriate treatment process performance records. Furthermore, I agree to provide these additional operations records to the PWS owner so the PWS owner can retain them, together with copies of this report, at a convenient location for at least ten years.



8/8/2022	Kevin R. Rogers	8379-A
Signature and Date	Printed or Typed Name	License Number

MONTHLY OPERATION REPORT FOR PWSs TREATING RAW GROUND WATER OR PURCHASED FINISHED WATER

PWS Identification Number: **4474515** | Plant Name: **FPL Clean Energy Center**

III. Daily Data for the Month/Year of: **July 2022**

Means of Achieving Four-Log Virus: [ ]Free Chlorine [ ]Chlorine Dioxide [ ]Ozone [ ]Combined Chlorine (Chloramines) [ ]Ultraviolet Radiation [ ]Other:

Type of Disinfectant Residual Maintained in: [X]Free Chlorine [ ]Combined Chlorine (Chloramines) [ ]Chlorine Dioxide

Day of the Month	Days Plant Staffed or Visited by Operator (Place "X")	Hours Plant in Operation	Net Quantity of Finished Water Produced, gal	CT Calculations, or UV Dose, to Demonstrate Four-Log Virus Inactivation, if Applicable*									Lowest Residual Disinfectant Concentration at Remote Point in Distribution System, mg/L	Emergency or Abnormal Operating Conditions; Repair or Maintenance Work that Involves Taking Water System Components Out of Operation
				CT Calculations							UV Dose			
				Peak Flow Rate, gpd	Disinfectant Concentration (C) Before or at First Customer During Peak Flow, mg/L	Disinfectant Contact Time (T) at C Measurement Point During Peak Flow, minutes	mg-min/L	Temp. of Water, °C	pH of Water, if Applicable	Minimum CT Required, mg-min/L	Lowest Operating UV Dose, mW-sec/cm^2	Minimum UV Dose Required, mW-sec/cm^2		
1	x	24	2,500										0.2	
2		24	4,000											
3		24	4,000											
4		24	4,000											
5	x	24	4,000										0.3	
6		24	4,000											
7	x	24	4,000										0.4	
8		24	3,500											
9	x	24	3,500										0.2	
10		24	**5,000**											
11	x	24	**5,000**										0.2	
12		24	3,000											
13	x	24	3,000										0.3	
14		24	**5,000**											
15	x	24	**5,000**										0.2	
16		24	3,700											
17		24	3,700											
18	x	24	3,700										0.4	
19		24	**5,000**											
20	x	24	**5,000**										0.4	
21		24	2,500											
22	x	24	2,500										0.2	
23		24	3,300											
24		24	3,300											
25	x	24	3,300										0.3	
26		24	4,500											
27	x	24	4,500										0.2	
28		24	3,500											
29	x	24	3,500										0.4	
30		24	4,200											
31		24	4,200											
Total			119,900											
Average			**3,868**											
Maximum			**5,000**											

* Refer to the instructions for this report to determine which plants must provide this information.

LOWEST RESIDUAL 0.2 days checked by operator 13

DAYS IN MONTH 31

MONTHLY OPERATION REPORT FOR PWSs TREATING RAW GROUND WATER OR PURCHASED FINISHED WATER

See last page for instructions.

I. General Information for the Month/Year of: August-22

A. Public Water System (PWS) Information

PWS Name:	**FPL Clean Energy Center**		PWS Identification Number	**4474515**
PWS Type:	[ ]Community	[X]Non-Transient Non-Community	[ ]Transient Non-Community	[ ]Consecutive
Number of Service Connections at End of Month:			Total Population Served at End of Month:	
PWS Owner:	FPL Clean Energy Center			
Contact Person:	Tiffany Brady		Contact Person's Title:	
Contact Person's Mailing Address:	21505 SR 60	City: Vero Beach	State: FL	Zip Code: 32966
Contact Person's Telephone Number:	772-778-7039		Contact Person's Fax Number:	
Contact Person's E-Mail Address:	tiffany.brady@fpl.com			

B. Water Treatment Plant Information

Plant Name:	**FPL Clean Energy Center**		Plant Telephone	
Plant Address:	21505 SR 60	City: Vero Beach	State: FL	Zip Code: 32966
Type of Water Treated by Plant:	[X] Raw Ground Water	[ ] Purchased Finished Water		
Permitted Maximum Day Operating Capacity of Plant,				
Plant Category (per subsection 62-699.310(4),	V	Plant Class (per subsection 62-699.310(4), F.A.C.):	D	

Licensed Operators	Name	License Number	License Class	Day(s)/Shift(s) Worked
Lead/Chief Operator:	Kevin R. Rogers	8379	A	three non-consecutive visits per week
Other Operators:				

II. Certification by Lead/Chief Operator

I, the undersigned water treatment plant operator licensed in Florida, am the lead/chief operator of the water treatment plant identified in Part I of this report. I certify that the information provided in this report is true and accurate to the best of my knowledge and belief. I certify that all drinking water treatment chemicals used at this plant conform to NSF International Standard 60 or other applicable standards referenced in subsection 62-555.320(3), F.A.C. I also certify that the following additional operations records for this plant were prepared each day that a licensed operator staffed or visited this plant during the month indicated above: (1) records of amounts of chemicals used and chemical feed rates; and (2) if applicable, appropriate treatment process performance records. Furthermore, I agree to provide these additional operations records to the PWS owner so the PWS owner can retain them, together with copies of this report, at a convenient location for at least ten years.



9/1/2022	Kevin R. Rogers	8379-A
Signature and Date	Printed or Typed Name	License Number

MONTHLY OPERATION REPORT FOR PWSs TREATING RAW GROUND WATER OR PURCHASED FINISHED WATER

PWS Identification Number: **4474515** | Plant Name: **FPL Clean Energy Center**

III. Daily Data for the Month/Year of: **August 2022**

Means of Achieving Four-Log Virus: [ ]Free Chlorine [ ]Chlorine Dioxide [ ]Ozone [ ]Combined Chlorine (Chloramines) [ ]Ultraviolet Radiation [ ]Other:

Type of Disinfectant Residual Maintained in: [X]Free Chlorine [ ]Combined Chlorine (Chloramines) [ ]Chlorine Dioxide

Day of the Month	Days Plant Staffed or Visited by Operator (Place "X")	Hours Plant in Operation	Net Quantity of Finished Water Produced, gal	CT Calculations, or UV Dose, to Demonstrate Four-Log Virus Inactivation, if Applicable*									Lowest Residual Disinfectant Concentration at Remote Point in Distribution System, mg/L	Emergency or Abnormal Operating Conditions; Repair or Maintenance Work that Involves Taking Water System Components Out of Operation
				CT Calculations							UV Dose			
				Peak Flow Rate, gpd	Disinfectant Concentration (C) Before or at First Customer During Peak Flow, mg/L	Disinfectant Contact Time (T) at C Measurement Point During Peak Flow, minutes	mg-min/L	Temp. of Water, °C	pH of Water, if Applicable	Minimum CT Required, mg-min/L	Lowest Operating UV Dose, mW-sec/cm^2	Minimum UV Dose Required, mW-sec/cm^2		
1	x	24	4,200											Lightning Delay No Entry
2		24	8,300											
3	x	24	8,300											Lightning Delay No Entry
4	x	24	8,300										0.6	
5	x	24	3,000										0.4	
6		24	4,000											
7		24	4,000											
8	x	24	4,000											Lightning Delay No Entry
9		24	4,000											
10	x	24	4,000										0.2	
11		24	4,000											
12	x	24	4,000										0.3	
13		24	3,700											
14		24	3,700											
15	x	24	3,700										0.2	
16		24	5,500											
17	x	24	5,500										0.2	
18		24	3,500											
19	x	24	3,500										0.3	
20		24	4,000											
21		24	4,000											
22	x	24	4,000										0.2	
23		24	3,000											
24		24	3,000											
25	x	24	3,000										0.3	
26		24	2,800											
27	x	24	2,800											Storming could not Visit
28	x	24	2,800											No Guard could not enter
29	x	24	2,800										0.2	
30		24	3,000											
31	x	24	3,000										1.8	
Total			127,400											
Average			**4,110**											
Maximum			**8,300**											

* Refer to the instructions for this report to determine which plants must provide this information.

LOWEST RESIDUAL 0.2 days checked by operator 16

DAYS IN MONTH 31

MONTHLY OPERATION REPORT FOR PWSs TREATING RAW GROUND WATER OR PURCHASED FINISHED WATER

See last page for instructions.

I. General Information for the Month/Year of: September-22

A. Public Water System (PWS) Information

PWS Name:	**FPL Clean Energy Center**		PWS Identification Number	**4474515**
PWS Type:	[ ]Community	[X]Non-Transient Non-Community	[ ]Transient Non-Community	[ ]Consecutive
Number of Service Connections at End of Month:			Total Population Served at End of Month:	
PWS Owner:	FPL Clean Energy Center			
Contact Person:	Carolyn Adams		Contact Person's Title:	
Contact Person's Mailing Address:	21505 SR 60	City: Vero Beach	State: FL	Zip Code: 32966
Contact Person's Telephone Number:	910-818-8568		Contact Person's Fax Number:	
Contact Person's E-Mail Address:	carolyn.adams@fpl.com			

B. Water Treatment Plant Information

Plant Name:	**FPL Clean Energy Center**		Plant Telephone	
Plant Address:	21505 SR 60	City: Vero Beach	State: FL	Zip Code: 32966
Type of Water Treated by Plant:	[X] Raw Ground Water	[ ] Purchased Finished Water		
Permitted Maximum Day Operating Capacity of Plant,				
Plant Category (per subsection 62-699.310(4),	V	Plant Class (per subsection 62-699.310(4), F.A.C.):	D	

Licensed Operators	Name	License Number	License Class	Day(s)/Shift(s) Worked
Lead/Chief Operator:	Kevin R. Rogers	8379	A	three non-consecutive visits per week
Other Operators:				

II. Certification by Lead/Chief Operator

I, the undersigned water treatment plant operator licensed in Florida, am the lead/chief operator of the water treatment plant identified in Part I of this report. I certify that the information provided in this report is true and accurate to the best of my knowledge and belief. I certify that all drinking water treatment chemicals used at this plant conform to NSF International Standard 60 or other applicable standards referenced in subsection 62-555.320(3), F.A.C. I also certify that the following additional operations records for this plant were prepared each day that a licensed operator staffed or visited this plant during the month indicated above: (1) records of amounts of chemicals used and chemical feed rates; and (2) if applicable, appropriate treatment process performance records. Furthermore, I agree to provide these additional operations records to the PWS owner so the PWS owner can retain them, together with copies of this report, at a convenient location for at least ten years.



10/10/2022	Kevin R. Rogers	8379-A
Signature and Date	Printed or Typed Name	License Number

MONTHLY OPERATION REPORT FOR PWSs TREATING RAW GROUND WATER OR PURCHASED FINISHED WATER

PWS Identification Number: **4474515** | Plant Name: **FPL Clean Energy Center**

III. Daily Data for the Month/Year of: **September 2022**

Means of Achieving Four-Log Virus [ ]Free Chlorine [ ]Chlorine Dioxide [ ]Ozone [ ]Combined Chlorine (Chloramines) [ ]Ultraviolet Radiation [ ]Other:

Type of Disinfectant Residual Maintained in [X]Free Chlorine [ ]Combined Chlorine (Chloramines) [ ]Chlorine Dioxide

Day of the Month	Days Plant Staffed or Visited by Operator (Place "X")	Hours Plant in Operation	Net Quantity of Finished Water Produced, gal	CT Calculations, or UV Dose, to Demonstrate Four-Log Virus Inactivation, if Applicable*									Lowest Residual Disinfectant Concentration at Remote Point in Distribution System, mg/L	Emergency or Abnormal Operating Conditions; Repair or Maintenance Work that Involves Taking Water System Components Out of Operation
				CT Calculations							UV Dose			
				Peak Flow Rate, gpd	Disinfectant Concentration (C) Before or at First Customer During Peak Flow, mg/L	Disinfectant Contact Time (T) at C Measurement Point During Peak Flow, minutes	mg-min/L	Temp. of Water, °C	pH of Water, if Applicable	Minimum CT Required, mg-min/L	Lowest Operating UV Dose, mW-sec/cm^2	Minimum UV Dose Required, mW-sec/cm^2		
1		24	3,000											
2	x	24	3,000										0.2	
3		24	4,200											
4		24	4,200											
5		24	4,200											
6	x	24	4,200										0.3	
7		24	3,800											
8	x	24	3,800											Lightning Delay could not enter
9		24	3,800											
10	x	24	3,800											No Guard no answer could not enter
11		24	3,800											
12	x	24	3,800										0.3	
13		24	4,000											
14	x	24	4,000										0.3	
15		24	4,000											
16	x	24	4,000										0.5	
17		24	3,700											
18		24	3,700											
19	x	24	3,700										0.2	
20		24	**5,000**											
21	x	24	**5,000**										2.0	
22		24	2,500											
23	x	24	2,500										1.2	
24		24	4,200											
25	x	24	4,200										2.0	
26		24	4,200											
27	x	24	4,200										1.5	
28		24	**5,000**											
29		24	**5,000**											
30	x	24	**5,000**										0.5	
31		24												
Total			119,500											
Average			**3,983**											
Maximum			**5,000**											

* Refer to the instructions for this report to determine which plants must provide this information.

LOWEST RESIDUAL 0.2 days checked by operator 13

DAYS IN MONTH 30

MONTHLY OPERATION REPORT FOR PWSs TREATING RAW GROUND WATER OR PURCHASED FINISHED WATER

See last page for instructions.

I. General Information for the Month/Year of: October-22

A. Public Water System (PWS) Information

PWS Name:	**FPL Clean Energy Center**		PWS Identification Number	**4474515**
PWS Type:	[ ]Community	[X]Non-Transient Non-Community	[ ]Transient Non-Community	[ ]Consecutive
Number of Service Connections at End of Month:			Total Population Served at End of Month:	
PWS Owner:	FPL Clean Energy Center			
Contact Person:	Carolyn Adams		Contact Person's Title:	
Contact Person's Mailing Address:	21505 SR 60	City: Vero Beach	State: FL	Zip Code: 32966
Contact Person's Telephone Number:	910-818-8568		Contact Person's Fax Number:	
Contact Person's E-Mail Address:	carolyn.adams@fpl.com			

B. Water Treatment Plant Information

Plant Name:	**FPL Clean Energy Center**		Plant Telephone	
Plant Address:	21505 SR 60	City: Vero Beach	State: FL	Zip Code: 32966
Type of Water Treated by Plant:	[X] Raw Ground Water	[ ] Purchased Finished Water		
Permitted Maximum Day Operating Capacity of Plant,				
Plant Category (per subsection 62-699.310(4),	V	Plant Class (per subsection 62-699.310(4), F.A.C.):	D	

Licensed Operators	Name	License Number	License Class	Day(s)/Shift(s) Worked
Lead/Chief Operator:	Kevin R. Rogers	8379	A	three non-consecutive visits per week
Other Operators:				

II. Certification by Lead/Chief Operator

I, the undersigned water treatment plant operator licensed in Florida, am the lead/chief operator of the water treatment plant identified in Part I of this report. I certify that the information provided in this report is true and accurate to the best of my knowledge and belief. I certify that all drinking water treatment chemicals used at this plant conform to NSF International Standard 60 or other applicable standards referenced in subsection 62-555.320(3), F.A.C. I also certify that the following additional operations records for this plant were prepared each day that a licensed operator staffed or visited this plant during the month indicated above: (1) records of amounts of chemicals used and chemical feed rates; and (2) if applicable, appropriate treatment process performance records. Furthermore, I agree to provide these additional operations records to the PWS owner so the PWS owner can retain them, together with copies of this report, at a convenient location for at least ten years.



11/1/2022	Kevin R. Rogers	8379-A
Signature and Date	Printed or Typed Name	License Number

MONTHLY OPERATION REPORT FOR PWSs TREATING RAW GROUND WATER OR PURCHASED FINISHED WATER

PWS Identification Number: **4474515** | Plant Name: **FPL Clean Energy Center**

III. Daily Data for the Month/Year of: **October 2022**

Means of Achieving Four-Log Virus: [ ]Free Chlorine [ ]Chlorine Dioxide [ ]Ozone [ ]Combined Chlorine (Chloramines) [ ]Ultraviolet Radiation [ ]Other:

Type of Disinfectant Residual Maintained in: [X]Free Chlorine [ ]Combined Chlorine (Chloramines) [ ]Chlorine Dioxide

Day of the Month	Days Plant Staffed or Visited by Operator (Place "X")	Hours Plant in Operation	Net Quantity of Finished Water Produced, gal	CT Calculations, or UV Dose, to Demonstrate Four-Log Virus Inactivation, if Applicable*									Lowest Residual Disinfectant Concentration at Remote Point in Distribution System, mg/L	Emergency or Abnormal Operating Conditions; Repair or Maintenance Work that Involves Taking Water System Components Out of Operation
				CT Calculations							UV Dose			
				Peak Flow Rate, gpd	Disinfectant Concentration (C) Before or at First Customer During Peak Flow, mg/L	Disinfectant Contact Time (T) at C Measurement Point During Peak Flow, minutes	mg-min/L	Temp. of Water, °C	pH of Water, if Applicable	Minimum CT Required, mg-min/L	Lowest Operating UV Dose, mW-sec/cm^2	Minimum UV Dose Required, mW-sec/cm^2		
1		**24**	4,300											
2		**24**	4,300											
3	**x**	**24**	4,300										**0.0**	Under a boil water notice
4		**24**	3,000											
5	**x**	**24**	3,000										**0.0**	Under boil water notice
6		**24**	**5,500**											
7	**x**	**24**	**5,500**										2.5	
8		**24**	5,000											
9		**24**	5,000											
10	**x**	**24**	5,000										2.5	
11		**24**	4,500											
12	**x**	**24**	4,500										0.5	
13		**24**	4,500											
14	**x**	**24**	4,500										2.0	
15		**24**	4,000											
16		**24**	4,000											
17	**x**	**24**	4,000										0.4	
18		**24**	4,500											
19	**x**	**24**	4,500										1.5	
20		**24**	4,000											
21	**x**	**24**	4,000										0.5	
22		**24**	4,000											
23		**24**	4,000											
24	**x**	**24**	4,000										0.4	
25		**24**	2,000											
26	**x**	**24**	2,000										0.5	
27		**24**	4,500											
28	**x**	**24**	4,500										1.0	
29		**24**	4,000											
30		**24**	4,000											
31	**x**	**24**	4,000										1.2	
Total			128,900											
Average			**4,158**											
Maximum			**5,500**											

* Refer to the instructions for this report to determine which plants must provide this information.

LOWEST RESIDUAL 0.0 days checked by operator 13

DAYS IN MONTH 31

Appendix D

Chemical Safety Data Sheets

ChemChlor 160

Safety Data Sheet

Revision: 2
Updated 03/09/2021

1. Identification

Product identifier **ChemChlor 160**

Other means of identification

Synonyms Sodium Hypochlorite Solution, Bleach.

Recommended use Industrial/Municipal by personnel familiar with product.

Recommended restrictions None known.

Company name Chemstream, Inc.

Address 511 Railroad Ave
Homer City, PA 15748

General Information

Telephone (724)-915-8388

Website www.chemstream.com

Emergency phone number CHEMTREC
US: 1-800-424-9300

Certified to NSF/ANSI/CAN 60

2. Hazard(s) identification

Physical hazards	Corrosive to metals	Category 1
Health hazards	Skin corrosion/irritation	Category 1
	Serious eye damage/eye irritation	Category 1
	Specific target organ toxicity, single exposure	Category 3 respiratory tract irritation
Environmental hazards	Hazardous to the aquatic environment, acute hazard	Category 1
	Hazardous to the aquatic environment, long-term hazard	Category 2

OSHA defined hazards Not classified.

Label elements



Signal word Danger

Hazard statement May be corrosive to metals. Causes severe skin burns and eye damage. May cause respiratory irritation. Very toxic to aquatic life. Toxic to aquatic life with long lasting effects.

Precautionary statement

Prevention Wear protective gloves/protective clothing/eye protection/face protection. Do not breathe mist or vapor. Use only outdoors or in a well-ventilated area. Wash thoroughly after handling. Keep only in original container. Avoid release to the environment.

Response If swallowed: Rinse mouth. Do NOT induce vomiting. If inhaled: Remove person to fresh air and keep comfortable for breathing. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center/doctor. Wash contaminated clothing before reuse. Absorb spillage to prevent material damage. Collect spillage.

Storage Store in a well-ventilated place. Keep container tightly closed. Store locked up. Store in corrosive resistant container with a resistant inner liner.

Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC)	None known.
Supplemental information	

Contact with acids liberates toxic gas.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Sodium hypochlorite	7681-52-9	12.5-15.6
Sodium hydroxide	1310-73-2	0.1 - 2.0

4. First-aid measures

Inhalation	Move to fresh air. Call a physician if symptoms develop or persist.
Skin contact	Take off immediately all contaminated clothing. Wash off IMMEDIATELY with plenty of water for at least 15-20 minutes. Get medical attention immediately. Wash contaminated clothing before reuse. Call a physician or poison control center immediately.
Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention immediately.
Ingestion	Call a physician or poison control center immediately. Rinse mouth. Do not induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.
Most important symptoms/effects, acute and delayed	Corrosive effects. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result.
Indication of immediate medical attention and special treatment needed	Treat symptomatically. Chemical burns: Flush with water immediately. While flushing, remove clothes which do not adhere to affected area. Call an ambulance. With eye exposure, continue flushing during transport to hospital.
General information	Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance.

5. Fire-fighting measures

Suitable extinguishing media	Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).
Unsuitable extinguishing media	Do not use water jet as an extinguisher, as this will spread the fire. Do not use dry extinguishing media that contains ammonium compounds.
Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire-fighting equipment/instructions	In case of fire and/or explosion do not breathe fumes. Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	No unusual fire or explosion hazards noted.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Keep unnecessary personnel away. Wear appropriate personal protective equipment. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Absorb spillage to prevent material damage. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see Section 8 of the SDS.

Methods and materials for containment and cleaning up

Large Spills: Stop the flow of material if this is without risk. Dike the spilled material, where this is possible. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water.

Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination.

Never return spills in original containers for re-use. For waste disposal, see Section 13 of the SDS.

Environmental precautions

Do not discharge into drains, water courses or onto the ground. Environmental manager must be informed of all major releases.

7. Handling and storage

Precautions for safe handling

Wear appropriate personal protective equipment. Do not get in eyes, on skin, on clothing. Use with adequate ventilation. Observe good industrial hygiene practices. Do not apply heat or direct sunlight. Temperature and product concentration affect product quality and decomposition rates.

Conditions for safe storage, including any incompatibilities

Keep container tightly closed. Store in a cool and well-ventilated place. Store in a corrosive resistant container. Consult container manufacturer for additional guidance. Store away from and do not mix with incompatible materials such as acids, oxidizers, organics, reducing agents, and all metals except titanium.

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value
Sodium hydroxide (CAS1310-73-2)	PEL	2 mg/m3

US. ACGIH Threshold Limit Values

Components	Type	Value
Sodium hydroxide (CAS1310-73-2)	Ceiling	2 mg/m3

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
Sodium hydroxide (CAS1310-73-2)	Ceiling	2 mg/m3

US. Workplace Environmental Exposure Level (WEEL) Guides

Components	Type	Value
Sodium hypochlorite (CAS7681-52-9)	STEL	2 mg/m3

Biological limit values

No biological exposure limits noted for the ingredient(s).

Appropriate engineering controls

Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Eye wash facilities and emergency shower must be available when handling this product**.**

Individual protection measures, such as personal protective equipment

Eye/face protection

Wear safety glasses with side shields (or goggles) and a face shield. Wear a full-face respirator, if needed.

Skin protection

Hand protection	Wear appropriate chemical resistant gloves.
Other	Wear appropriate chemical resistant clothing. Reports indicate that sodium hypochlorite can react with various fabrics usually increasing with concentration. Reactions vary significantly depending on strength of chemical, material, fabric treatment and color of dyes. FRC treated cotton has a stronger response than plain cotton. Poly blend fabrics and meta aramid fabric have a weaker response than natural fibers. Contact the Personal Protective Equipment manufacturer for specific information about their products.
Respiratory protection	If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations

Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance

Physical state	Liquid
Form	Liquid
Color	Not Available
Odor	Pungent
Odor threshold	0.9 mg/m³
pH	12 - 14 (25 °C/77 °F)
Melting point/freezing point	-11 °F (-24 °C) (12.5% solution)
Initial boiling point and boiling range	Not available.
Flash point	Not applicable
Evaporation rate	No data available
Flammability (solid, gas)	Not available.

Upper/lower flammability or explosive limits

Flammability limit - lower (%)	Not applicable
Flammability limit - upper (%)	Not applicable
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	12 mm Hg (20°C/68°F)
Vapor density	Not available.
Relative density	Not available.

Solubility(ies)

Solubility (water)	Completely miscible
Partition coefficient (n-octanol/water)	Not available.

Auto-ignition temperature	Not applicable
Decomposition temperature	Not available.
Viscosity	Not available.
Other information	
Bulk density	Not applicable
Molecular formula	NaOCl
Molecular weight	74.5 g/mol

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	Hazardous polymerization does not occur
Conditions to avoid	Contact with incompatible materials. Avoid ultraviolet (UV) light sources. Excessive heat. Reacts violently with strong acids. Acid contact will produce chlorine gas. Amine contact will produce chloramines.
Incompatible materials	Strong oxidizing agents. Acids. Metals. Organic compounds. Ammonia.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Ingestion	Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea. Ingestion may produce burns to the lips, oral cavity, upper airway, esophagus and possibly the digestive tract.
Inhalation	Vapors and spray mist may irritate throat and respiratory system and cause coughing.
Skin contact	Causes skin burns.
Eye contact	Causes eye burns.

Symptoms related to the physical, chemical and toxicological characteristics

Corrosive effects. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result.

Information on toxicological effects

Acute toxicity Occupational exposure to the substance or mixture may cause adverse effects.

	Species	Test Results
Acute Toxicity		
Dermal		
LD50	Rabbit	> 2 g/kg
Oral		
LD50	Rat	3-5 g/kg
Inhalation		
LC50	Rat (Dust/Mist)	>10.5 mg/L

Skin corrosion/irritation	Causes severe skin burns and eye damage.
Serious eye damage/eye irritation	Causes serious eye damage.
Respiratory or skin sensitization	
Respiratory sensitization	No data available.
Skin sensitization	No data available.
Germ cell mutagenicity	No data available to indicate product or any components present at greater than 0.1%

are mutagenic or genotoxic.

Carcinogenicity This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

IARC Monographs. Overall Evaluation of Carcinogenicity

Sodium hypochlorite (CAS 7681-52-9)	3 Not classifiable as to carcinogenicity to humans.

Reproductive toxicity No data available.

Specific target organ toxicity - single exposure May cause respiratory irritation.

Specific target organ toxicity - repeated exposure No data available.

Aspiration hazard Not classified, however droplets of the product may be aspirated into the lungs through ingestion or vomiting and may cause a serious chemical pneumonia.

Chronic effects Prolonged or repeated overexposure causes lung damage.

Further information Prolonged inhalation may be harmful.

12. Ecological information

Ecotoxicity Very toxic to aquatic life. Toxic to aquatic life with long lasting effects.

		Species	Test Results
Aquatic			
Crustacea	LC50	Daphnia	1 mg/l
Crustacea	EC50	Daphnia	0.035 mg/L, 48 hours
Fish	LC50	Bluegill (Lepomis macrochirus)	0.6 mg/l, 48 hours

Persistence and degradability No data is available on the degradability of this product.

Bioaccumulative potential No data available for this product.

Mobility in soil Not available.

Other adverse effects No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal considerations

Disposal instructions Collect and reclaim or dispose in sealed containers at licensed waste disposal site. This material and its container must be disposed of as hazardous waste. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazardous waste code The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Waste from residues / unused products Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

Contaminated packaging Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal

.

14. Transport information

DOT

UN number	UN 1791
UN proper shipping name	Hypochlorite solutions
Transport hazard class(es)	
Class	8
Subsidiary risk	-
Packing group	III
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
Special provisions	IB3, N34, T4, TP2, TP24
Packaging exceptions	154
Packaging non bulk	203
Packaging bulk	241

IATA

UN number	UN 1791
UN proper shipping name	Hypochlorite solution
Transport hazard class(es)	
Class	8
Subsidiary risk	-
Label(s)	8
Packing group	III
Environmental hazards	Yes
ERG Code	8L
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling

IMDG

UN number	UN 1791
UN proper shipping name	HYPOCHLORITE SOLUTION
Transport hazard class(es)	
Class	8
Subsidiary risk	-
Label(s)	8
Packing group	III
Environmental hazards	
Marine pollutant	Yes
EmS	F-A, S-B
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

Transport in bulk according toAnnex II of MARPOL 73/78 andthe IBC Code

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

CERCLA Hazardous Substance List (40 CFR 302.4)

Sodium hydroxide (CAS 1310-73-2)	LISTED
Sodium hypochlorite (CAS 7681-52-9)	LISTED

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories Immediate Hazard - Yes
Delayed Hazard - No
Fire Hazard - No
Pressure Hazard - No

Reactivity Hazard - No

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardouschemical

Yes

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act(SDWA)

Not regulated.

US state regulations

US. Massachusetts RTK - Substance List

Sodium hydroxide (CAS 1310-73-2)
Sodium hypochlorite (CAS 7681-52-9)

US. New Jersey Worker and Community Right-to-Know Act

Sodium hydroxide (CAS 1310-73-2)
Sodium hypochlorite (CAS 7681-52-9)

US. Pennsylvania Worker and Community Right-to-Know Law

Sodium hydroxide (CAS 1310-73-2)
Sodium hypochlorite (CAS 7681-52-9)

US. Rhode Island RTK

Sodium hydroxide (CAS 1310-73-2)
Sodium hypochlorite (CAS 7681-52-9)

US. California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance

Not listed.

International Inventories

Country(s) or region	Inventory Name	On inventory(yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial ChemicalSubstances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances(PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s). A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

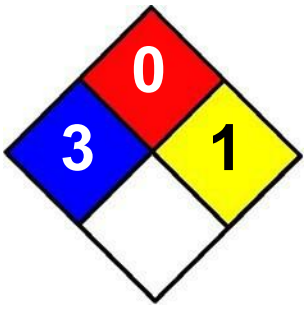
16. Other information, including date of preparation or last revision

USEPA Registration Number 92757-1

ANSI/NSF Standard 60 Certified Maximum Use Level: 56 mg/L

Issue Date May 5, 2015 **Revision Date** March 9, 2021

NFPA Ratings



List of abbreviations

LD50: Lethal Dose, 50%.
LC50: Lethal Concentration, 50%.
EC50: Effective concentration, 50%.
TWA: Time weighted average.

References

EPA: AQUIRE database
HSDB® - Hazardous Substances Data Bank
US. IARC Monographs on Occupational Exposures to Chemical Agents
IARC Monographs. Overall Evaluation of Carcinogenicity
ACGIH Documentation of the Threshold Limit Values and Biological Exposure Indices
Olin Chlor Alkali Products Safety Data Sheet

Disclaimer

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product or considered a Certificate of Analysis. Supplier believes the information contained herein is accurate; however, supplier makes no guarantees or warranties with respect to such accuracy and assumes no liability in connection with the use of the information contained herein by any party. The provision of the information contained herein by supplier is not intended to be and should not be construed as legal advice or as ensuring compliance by other parties. Judgments as to the suitability of the information contained herein for the party's own use or purposes are solely the responsibility of that party. Any party handling, transferring, transporting, storing, applying or otherwise using this product should review thoroughly all applicable laws, rules, regulations, standards and good engineering practices. Such thorough review should occur before the party handles, transfers, transports, stores, applies or otherwise uses this product.

CHEMSTREAM
WATER TREATMENT AND DUST SUPPRESSION SOLUTIONS

Sodium Bisulfite

Safety Data Sheet
Revision date: December 5, 2016

SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT IDENTIFIER: Sodium Bisulfite

OTHER IDENTIFIERS: N/A

DISTRIBUTED BY: Chemstream, Inc.
166 Commerce Drive
Stoystown, PA 15563

PHONE NUMBERS: Business – (814) 629-7118 (business hours)
CHEMTREC - (800) 424-9300 (transportation emergencies)

NSF Certified to NSF/ANSI 60

SECTION 2 - HAZARDS IDENTIFICATION

Hazard Statements

H290 May be corrosive to metals.
H314 Causes severe skin burns and eye damage.
H335 May cause respiratory irritation.

Signal word

Warning

Precautionary statements

P260 Do not breathe dust/fume/gas/mist/vapors/spray.
P262 Do not get in eyes, on skin, or on clothing.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P301+330+331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

Pictograms of Hazards



SECTION 3 - COMPOSITION / INFORMATION ON INGREDIENTS

Component	CAS No.	%
Water	7732-18-5	58-73
Sodium Bisulfite	7631-90-5	27-42

SECTION 4 - FIRST AID MEASURES

4.1 GENERAL ADVICE:

First Aid responders should pay attention to self-protection and use the recommended protective clothing (chemical resistant gloves, splash protection). If potential for exposure exists, refer to Section 8 for specific personal protective equipment.

4.2 EYE CONTACT:
If this product enters the eyes, open eyes while under gently running water. Use sufficient force to open eyelids. "Roll" eyes to expose more surface. Minimum flushing is for 15 minutes. Seek immediate medical attention.
4.3 SKIN CONTACT:
If the product contaminates the skin, immediately begin decontamination with running water. Minimum flushing is for 15 minutes. Remove contaminated clothing, taking care not to contaminate eyes. If skin becomes irritated and irritation persists, medical attention may be necessary. Wash contaminated clothing before reuse, discard contaminated shoes.
4.4 INHALATION:
After high vapor exposure, remove to fresh air. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. Keep person warm and at rest. breathing is difficult, give oxygen. If breathing has stopped, trained personnel should immediately begin artificial respiration. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt
or waistband. If the heart has stopped, trained personnel should immediately begin cardiopulmonary resuscitation (CPR). Seek immediate medical attention. In case of inhalation of decomposition products in a fire, symptoms may be delayed.The exposed person may need to be kept under medical surveillance for 48 hours.
4.5 SWALLOWING:
If swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. If professional advice is not available, give two glasses of water to drink. DO NOT INDUCE VOMITING. Never induce vomiting or give liquids to someone who is unconscious, having convulsions, or unable to swallow. Seek immediate medical attention.
4.6 NOTES TO PHYSICIAN:
There is no specific antidote. Treatment of overexposure should be directed at the control
of symptoms and the clinical condition of the patient. Any material aspirated during vomiting may cause lung injury. Therefore, emesis should not be induced mechanically or pharmacologically. If it is considered necessary to evacuate the stomach contents, this should be done by means least likely to cause aspiration (such as: Gastric lavage after endotracheal intubation). Victims of chemical exposure must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take a copy of label and SDS to physician or health professional with victim.

SECTION 5 - FIRE FIGHTING MEASURES

5.1 FIRE & EXPLOSION PREVENTIVE MEASURES
Isolate from oxidizers, acids, and extreme heat.
5.2 EXTINGUISHING MEDIA
Use appropriate extinguishing media for surrounding fire.
5.3 SPECIAL FIRE FIGHTING PROCEDURES
Water spray may be ineffective on fire but can protect fire-fighters & cool closed containers. Use fog nozzles if water is used. Do not enter confined fire-space without full bunker gear. (Helmet with face shield, bunker coats, gloves & rubber boots). Use NIOSH approved positive-pressure self-contained breathing apparatus.
5.4 UNUSUAL EXPLOSION AND FIRE PROCEDURES
Noncombustible. Thermal decomposition produces toxic fumes. Closed containers may explode if exposed to extreme heat. Applying to hot surfaces requires special precautions.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

6.1 SPILL AND LEAK RESPONSE AND ENVIRONMENTAL PRECAUTIONS:
Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a spill, clear the affected area, protect people, and respond with trained personnel.
6.2 PERSONAL PROTECTIVE EQUIPMENT
The proper personal protective equipment for incidental releases (such as: 1 Liter of the

product released in a well-ventilated area), use impermeable gloves (triple-gloves (rubber gloves and nitrile gloves, over latex gloves), goggles, face shield, and appropriate body protection. In the event of a large release, use impermeable gloves, specific for the material handled, chemically resistant suit and boots, and hard hat. Self-Contained Breathing Apparatus or respirator may be required where engineering controls are not adequate or conditions for potential exposure exist. When respirators are required, select NIOSH/MSHA approved based on actual or potential airborne concentrations in accordance with latest OSHA and/or ANSI recommendations.

6.3 ENVIRONMENTAL PRECAUTIONS:

Stop spill at source. Construct temporary dikes of dirt, sand, or any appropriate readily available material to prevent spreading of the material. Close or cap valves and/or block or plug hole in leaking container and transfer to another container. Keep from entering storm sewers and ditches which lead to waterways, and if necessary, call the local fire or police department for immediate emergency assistance.

6.4 CONTAINMENT AND CLEAN-UP MEASURES:

Absorb spilled liquid with polypads or other suitable absorbent materials. If necessary, neutralize using suitable buffering material, (acid with soda ash or base with phosphoric acid), and test area with litmus paper to confirm neutralization. Clean up with non-combustible absorbent (such as: sand, soil, and so on). Shovel up and place all spill residue in suitable containers. dispose of at an appropriate waste disposal facility according to current applicable laws and regulations and product characteristics at time of disposal (see Section 13 - Disposal Considerations).

SECTION 7 - HANDLING AND STORAGE

7.1 PRECAUTIONS FOR SAFE HANDLING

Isolate from oxidizers, heat, & open flame. Use only with adequate ventilation. Avoid breathing of vapor or spray mist. Avoid contact with skin & eyes. Wear OSHA Standard goggles or face shield. Consult Safety Equipment Supplier. Wear goggles, face shield, gloves, apron & footwear impervious to material. Wash clothing before reuse. Empty container very hazardous! Continue all label precautions!

7.2 CONDITIONS FOR SAFE STORAGE, INCLUDING ANY INCOMPATIBILITIES:

Isolate from acids, strong oxidants. Do not store above 49 C/120 F. Keep container tightly closed & upright when not in use to prevent leakage.

7.3 NONBULK: CONTAINERS:

Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Material should be stored in secondary containers or in a diked area, as appropriate. Store containers away from incompatible chemicals (see Section 10, Stability and Reactivity). Post warning and "NO SMOKING" signs in storage and use areas, as appropriate. Empty containers should be handled with care. Never store food, feed, or drinking water in containers which held this product.

7.4 BULK CONTAINERS:

All tanks and pipelines which contain this material must be labeled. Perform routine maintenance on tanks or pipelines which contain this product. Report all leaks immediately to the proper personnel.

7.5 TANK CAR SHIPMENTS:

Tank cars carrying this product should be loaded and unloaded in strict accordance with tank-car manufacturer's recommendation and all established on-site safety procedures. Appropriate personal protective equipment must be used (see Section 8, Engineering Controls and Personal Protective Equipment.). All loading and unloading equipment must be inspected, prior to each use. Loading and unloading operations must be attended, at all times. Tank cars must be level, brakes must be set or wheels must be locked or blocked prior to loading or unloading. Tank car (for loading) or storage tanks (for unloading) must be verified to be correct for receiving this product and be properly prepared, prior to starting the transfer operations. Hoses must be verified to be in the correct positions, before starting transfer operations. A sample (if required) must be taken and verified (if required) prior to starting transfer operations. All lines must be
blown-down and purged before disconnecting them from the tank car or vessel.

7.6 PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT:

Follow practices indicated in Section 6 (Accidental Release Measures). Make certain application equipment is locked and tagged-out safely. Always use this product in areas where adequate ventilation is

provided. Collect all rinsates and dispose of according to applicable Federal, State, Provincial, or local procedures.

7.7 EMPTY CONTAINER WARNING:

Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY BURST AND CAUSE INJURY OR DEATH.

SECTION 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

MATERIAL	CAS#	EINECS#	TWA (OSHA)	TLV (ACGIH)
Water	7732-18-5	231-791-2	None Known	None Known
Sodium Bisulfite	7631-90-5	-	None Known	None Known

This product contains no EPA Hazardous Air Pollutants (HAP) in amounts > 0.1%.

8.2 APPROPRIATE ENGINEERING CONTROLS:

RESPIRATORY EXPOSURE CONTROLS: Airborne concentrations should be kept to lowest levels possible. If vapor, dust or mist is generated and the occupational exposure limit of the product, or any component of the product, is exceeded, use appropriate NIOSH or MSHA approved air purifying or air-supplied respirator authorized in 29 CFR 1910.134, European Standard EN 149, or applicable State regulations, after determining the airborne concentration of the contaminant. Air supplied respirators should always be worn when airborne concentration of the contaminant or oxygen content is unknown. Maintain airborne contaminant concentrations below exposure limits. If adequate ventilation is not available or there is potential for airborne
exposure above the exposure limits, a respirator may be worn up to the respirator exposure limitations, check with respirator equipment manufacturer's recommendations/limitations.
For particulates, a particulate respirator (NIOSH Type N95 or better filters) may be worn.
If oil particles (such as: lubricants, cutting fluids, glycerine, and so on) are present, use a NIOSH Type R or P filter. For a higher level of protection, use positive pressure supplied air respiration protection or Self-Contained Breathing Apparatus or if oxygen levels are below 19.5% or are unknown.
EMERGENCY OR PLANNED ENTRY INTO UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS
Positive pressure, full-face piece Self-Contained Breathing Apparatus; or positive pressure, full-face piece Self-Contained Breathing Apparatus with an auxilliary positive pressure Self-Contained Breathing Apparatus.
VENTILATION
LOCAL EXHAUST: Necessary MECHANICAL (GENERAL): Necessary
SPECIAL: None OTHER: None
Please refer to ACGIH document, "Industrial Ventilation, A Manual of Recommended Practices", most recent edition, for details.

8.3 INDIVIDUAL PROTECTION MEASURES, SUCH AS PERSONAL PROTECTIVE EQUIPMENT:

EYE PROTECTION:
Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts. If contact is possible, chemical splash goggles should be worn, when a higher degree of protection is necessary, use splash goggles or safety glasses. Face-shields are recommended when the operation can generate splashes, sprays or mists.
HAND PROTECTION:
Use gloves chemically resistant to this material. Preferred examples: Butyl rubber, Chlorinated Polyethylene, Polyethylene, Ethyl vinyl alcohol laminate ("EVAL"), Polyvinyl alcohol ("PVA"). Examples of acceptable glove barrier materials include: Natural rubber ("latex"), Neoprene, Nitrile/butadiene rubber ("nitril") or ("NBR"),

Polyvinyl chloride ("PVC") or "vinyl"), Viton. Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.
BODY PROTECTION:
Use body protection appropriate for task. Cover-all, rubber aprons, or chemical protective clothing made from impervious materials are generally acceptable, depending on the task.
WORK & HYGIENIC PRACTICES:
Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using toilet facilities and at the end of the working period. Provide readily accessible eye wash stations & safety showers. Remove clothing that becomes contaminated. Destroy contaminated leather articles. Launder or discard contaminated clothing.
NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.
BODY PROTECTION:
Use body protection appropriate for task. Cover-all, rubber aprons, or chemical protective clothing made from impervious materials are generally acceptable, depending on the task.
WORK & HYGIENIC PRACTICES:
Provide readily accessible eye wash stations & safety showers. Wash at end of each shift & before eating, smoking or using the toilet. Remove clothing that becomes contaminated. Destroy contaminated leather articles. Launder or discard contaminated clothing.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Liquid, Straw Yellow
ODOR: Sharp, Pungent
ODOR THRESHOLD: Not Available
pH (Neutrality): 4.1 - 4.6
BOILING RANGE (IBP,50%,Dry Point): > 100 C / > 212 F
FLASH POINT (TEST METHOD): Not Applicable
EVAPORATION RATE (n-BUTYL ACETATE=1): Not Applicable
FLAMMABILITY CLASSIFICATION: Non-Combustible
LOWER FLAMMABLE LIMIT IN AIR (% by vol): Not Applicable
UPPER FLAMMABLE LIMIT IN AIR (% by vol): Not Available
VAPOR PRESSURE (mm of Hg)@20 C 9
VAPOR DENSITY (air=1): 0.670
GRAVITY @ 68/68 F / 20/20 C:
SPECIFIC GRAVITY (Water=1): 1.320
POUNDS/GALLON: 10.996
WATER SOLUBILITY: Complete
PARTITION COEFFICIENT (n-Octane/Water): Not Available
AUTO IGNITION TEMPERATURE: Not Applicable
DECOMPOSITION TEMPERATURE: Not Available
VOCs (>0.044 Lbs/Sq In) : 0.0 Vol% /0.0 g/L / 0.000 Lbs/Gal
TOTAL VOC'S (TVOC)*: 0.0 Vol% /0.0 g/L / 0.000 Lbs/Gal
NONEXEMPT VOC'S (CVOC)*: 0.0 Vol% /0.0 g/L / 0.000 Lbs/Gal
HAZARDOUS AIR POLLUTANTS (HAPS): 0.0 Wt% /0.0 g/L / 0.000 Lbs/Gal
NONEXEMPT VOC PARTIAL PRESSURE (mm of Hg @ 20 C) 0.0
* Using California Air Resources Board (CARB) Rule 310.

SECTION 10 - STABILITY AND REACTIVITY

10.1 STABILITY
Stable under normal conditions.
10.2 CONDITIONS TO AVOID
Gradually oxidizes to sodium sulfate on exposure to air. Temperatures at or near boiling point causes evolution of toxic and corrosive sulfur dioxide.
10.3 MATERIALS TO AVOID
Mineral acids, oxidizing agents. Contact with acid liberates irritating sulfur dioxide gas. Corrosive to steel, carbon steel, and other common materials of construction at ambient temperatures.
10.4 HAZARDOUS DECOMPOSITION PRODUCTS
Sodium Oxide & Hydroxide, Sulfur Dioxide from heating.
10.5 HAZARDOUS POLYMERIZATION
Will not occur.

SECTION 11 - TOXICOLOGICAL INFORMATION

11.1 ACUTE HAZARDS
11.11 EYE & SKIN CONTACT:
CORROSIVE! Causes severe skin burns. Causes severe eye damage. Wash thoroughly after handling.
11.12 INHALATION:
Mist irritating to respiratory tract.
11.13 SWALLOWING:
Swallowing can cause abdominal irritation, nausea, vomiting & diarrhea.
11.2 SUBCHRONIC HAZARDS/CONDITIONS AGGRAVATED
CONDITIONS AGGRAVATED
None Known.
11.3 CHRONIC HAZARDS
11.31 CANCER, REPRODUCTIVE & OTHER CHRONIC HAZARDS:
This product has no carcinogens listed by IARC, NTP, NIOSH, OSHA or ACGIH, as of this date, greater or equal to 0.1%.
11.32 IRRITANCY OF PRODUCT: This product is irritating to contaminated tissue.
11.33 SENSITIZATION TO THE PRODUCT: No component of this product is known to be a sensitizer.
11.34 MUTAGENICITY: This product is not reported to produce mutagenic effects in humans.
11.35 EMBRYOTOXICITY: This product is not reported to produce embryotoxic effects in humans.
11/36 TERATOGENICITY: This product is not reported to produce teratogenic effects in humans.
11.37REPRODUCTIVE TOXICITY: This product is not reported to cause reproductive effects in humans.A mutagen is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generational lines. An embryotoxin is a chemical which causes damage to a developing embryo (such as: within the eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A teratogen is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance which interferes in any way with the reproductive process.

MAMMALIAN TOXICITY INFORMATION
LD50 (Oral): 820 mg/kg (Mouse)

SECTION 12 - ECOLOGICAL INFORMATION

12.1 ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.
12.2 EFFECT OF MATERIAL ON PLANTS AND ANIMALS:
This product may be harmful or fatal to plant and animal life if released

into the environment. Refer to Section 11 (Toxicological Information) for further data on the effects of this product's components on test animals.
12.3 EFFECT OF MATERIAL ON AQUATIC LIFE:
No aquatic environmental information is available on this product.
12.4 MOBILITY IN SOIL
Mobility of this material has not been determined.
12.5 DEGRADABILITY
This product is completely biodegradable.
12.6 ACCUMULATION
Bioaccumulation of this product has not been determined.

SECTION 13 - DISPOSAL CONSIDERATIONS

The generation of waste should be avoided or minimized wherever possible.
Dispose of surplus and non-recyclable products via a licensed waste disposal contractor.
Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled.
Incineration or landfill should only be considered when recycling is not feasible.
This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers and liners may retain some product residues. Vapor from some product residues may create a highly flammable or explosive atmosphere inside the container. **DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE USED CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY BURST AND CAUSE INJURY OR DEATH.** Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Processing, use or contamination may change the waste management options. Recycle / dispose of observing national, regional, state, provincial and local health, safety & pollution laws. If in doubt, contact appropriate agencies. Deactivating Chemicals: Soda Ash, Lime or Limestone. EPA Waste Number: D002.

SECTION 14 - TRANSPORT INFORMATION

DOT/TDG SHIP NAME: UN2693, Bisulfites, aqueous solutions, n.o.s.(contains: Sodium Bisulfite), 8, PG-III
DRUM LABEL: Corrosive (8)IATA / ICAO: UN2693, Bisulfites, aqueous solutions, n.o.s.(contains: Sodium Bisulfite), 8, PG-III
IMO / IMDG: UN2693, Bisulfites, aqueous solutions, n.o.s.(contains: Sodium Bisulfite), 8, PG-III

EMERGENCY RESPONSE GUIDEBOOK NUMBER: 154

SECTION 15 - REGULATORY INFORMATION

15.1 EPA REGULATION:
SARA SECTION 311/312 HAZARDS: Acute Health, Chronic Health, Reactivity
All components of this product are on the TSCA list.
SARA Title III Section 313 Supplier Notification
This product contains the indicated <*> toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning & Community Right-To-Know Act of 1986 & of 40 CFR 372. This information must be included in all MSDSs that are copied and distributed for this material.
EPA CLEAN WATER ACT
Sodium Bisulfite is listed as a hazardous substance which, if discharged to the water, may require immediate response to mitigate dangers to human health and the environment.
SARA TITLE III

INGREDIENTS	CAS#	EINECS#	WT%	(REG.SECTION)	RQ(LBS)
Sodium Bisulfite	7631-90-5	-	27-42	(311,312)	5000

15.2 STATE REGULATIONS:
CALIFORNIA SAFE DRINKING WATER & TOXIC ENFORCEMENT ACT (PROPOSITION 65):

This product contains no chemicals known to the State of California
to cause cancer or reproductive toxicity.

15.3 INTERNATIONAL REGULATIONS

The components of this product are listed on the chemical inventories of the following countries:
Australia (AICS), Canada (DSL or NDSL), China (IECSC), Europe (EINECS, ELINCS)G
Japan (METI/CSCL, MHLW/ISHL), South Korea (KECI), New Zealand (NZIoC),
Philippines (PICCS), Switzerland (SWISS), Taiwan (NECSI), USA (TSCA).

15.4 CANADA: WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS)

D2B: Irritating to skin / eyes.
E: Corrosive
This product has been classified in accordance with hazard criteria of the Controlled
Products Regulations (CPR) and the SDS contains all the information required by the CPR.

SECTION 16 - OTHER INFORMATION

16.1 HAZARD RATINGS:

HEALTH (NFPA): 2, HEALTH (HMIS): 2, FLAMMABILITY: 0, PHYSICAL HAZARD: 0
(Personal Protection Rating to be supplied by user based on use conditions.)
This information is intended solely for the use of individuals
trained in the NFPA & HMIS hazard rating systems.

PREPARATION DATE: December 12, 2016
SUPERCEDES: New SDS
REASON FOR REVISION: N/A

The product information contained herein is believed to be accurate as of the date of the Safety Data Sheet, and is provided without warranty, expressed or implied, as to the results of use of this information or the product to which it relates. Recipient assumes all responsibility for the use of this information and the use (alone or in combination with any other product), storage or disposal of the product, including any resultant personal injury or property damage.

GE Infrastructure
Water & Process Technologies

Fact Sheet

Hypersperse™ MDC700

Antiscalant/Antifoulant

- Classified for use in producing potable water. (Classified to ANSI/NSF Standard 60)
- Effectively controls scales including calcium carbonate up to LSI +2.5, calcium sulfate, barium sulfate, and strontium sulfate
- Compatible with all of the leading RO membranes
- Maintains cleaner membrane surfaces by dispersing particulate foulants
- Includes uniquely effective proprietary GE Infrastructure Water & Process Technologies polymer
- Effective over a wide pH range
- May be fed neat or diluted
- Compatible with feedwaters that contain aluminum and iron oxides

Description and Use

Hypersperse™ MDC700 is a highly effective liquid antiscalant/antifoulant developed to control scale precipitates and reduce particulate fouling within membrane separation systems. The product includes a proprietary GE Infrastructure Water & Process Technologies polymer which makes it uniquely effective in providing longer run times and extended element life, resulting in reduced operating and capital costs. Industrial applications show excellent results in membrane separation processes including reverse osmosis (RO), nanofiltration (NF) and ultrafiltration (UF) applications.

Packaging Information

Hypersperse MDC700 is a liquid material, available in a wide variety of customized containers and methods. Contact your GE sales representative for details.

Application

For maximum effectiveness, Hypersperse MDC700 should be added prior to the static mixer or cartridge filter housing.

For potable application, the maximum dosage is 10 mg/L. Maximum dilution is 10% with RO permeate or DI water.

Dosing

Typical dosage range is between 3 and 6 mg/L.

Important Note: Over and under-dosing may cause membrane fouling so please contact your local GE representative to define the optimal feedpoint and dosage rate.

Maximum Dilutions

Maximum dilution is temperature related as shown below.

Temperature, °C	Maximum Dilution, %
<30	10
30-35	25
>35	50

Safety Precautions

A Material Safety Data Sheet containing detailed information about this product is available on request.

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GE
Water & Process Technologies

Material Safety Data Sheet

Issue Date: 21-SEP-2010
Supercedes: 12-FEB-2010

HYPERSPERSE MDC700

1 Identification

Identification of substance or preparation
HYPERSPERSE MDC700

Product Application Area
Membrane deposit control agent

Company/Undertaking Identification
GE Betz, Inc.
4636 Somerton Road
Trevose, PA 19053
T 215 355-3300, F 215 953 5524

Emergency Telephone
(800) 877-1940

Prepared by Product Stewardship Group: T 215-355-3300 Prepared on: 21-SEP-2010

2 Hazard(s) identification

****
EMERGENCY OVERVIEW

CAUTION

May cause slight irritation to the skin. May cause slight irritation to the eyes. Mists/aerosols may cause irritation to upper respiratory tract.

DOT hazard is not applicable
Odor: Slight; Appearance: Light Yellow To Amber, Liquid

Fire fighters should wear positive pressure self-contained breathing apparatus(full face-piece type). Proper fire-extinguishing media: dry chemical, carbon dioxide, foam or water
****

POTENTIAL HEALTH EFFECTS

ACUTE SKIN EFFECTS:
Primary route of exposure; May cause slight irritation to the skin.

ACUTE EYE EFFECTS:
May cause slight irritation to the eyes.

ACUTE RESPIRATORY EFFECTS:
Mists/aerosols may cause irritation to upper respiratory tract.

INGESTION EFFECTS:
May cause gastrointestinal irritation.

TARGET ORGANS:
No evidence of potential chronic effects.

MEDICAL CONDITIONS AGGRAVATED:
Not known.

SYMPTOMS OF EXPOSURE:
May cause redness or itching of skin.

3 Composition / information on ingredients

Information for specific product ingredients as required by the U.S. OSHA HAZARD COMMUNICATION STANDARD is listed. Refer to additional sections of this MSDS for our assessment of the potential hazards of this formulation.

HAZARDOUS INGREDIENTS:

This product is not hazardous as defined by OSHA regulations.

No component is considered to be a carcinogen by the National Toxicology Program, the International Agency for Research on Cancer, or the Occupational Safety and Health Administration at OSHA thresholds for carcinogens.

4 First-aid measures

SKIN CONTACT:
Wash thoroughly with soap and water. Remove contaminated clothing. Get medical attention if irritation develops or persists.

EYE CONTACT:
Remove contact lenses. Hold eyelids apart. Immediately flush eyes with plenty of low-pressure water for at least 15 minutes. Get medical attention if irritation persists after flushing.

INHALATION:
If nasal, throat or lung irritation develops - remove to fresh air and get medical attention.

INGESTION:
Do not feed anything by mouth to an unconscious or convulsive victim. Do not induce vomiting. Immediately contact physician. Dilute contents of stomach using 2-8 fluid ounces (60-240 mL) of milk or water.

NOTES TO PHYSICIANS:
No special instructions

5 Fire-fighting measures

FIRE FIGHTING INSTRUCTIONS:
Fire fighters should wear positive pressure self-contained breathing apparatus (full face-piece type).
EXTINGUISHING MEDIA:
dry chemical, carbon dioxide, foam or water
HAZARDOUS DECOMPOSITION PRODUCTS:
oxides of carbon, nitrogen, phosphorus and sulfur
FLASH POINT:
> 213F > 101C P-M(CC)

6 Accidental release measures

PROTECTION AND SPILL CONTAINMENT:
Ventilate area. Use specified protective equipment. Contain and absorb on absorbent material. Place in waste disposal container. Flush area with water. Wet area may be slippery. Spread sand/grit.
DISPOSAL INSTRUCTIONS:
Water contaminated with this product may be sent to a sanitary sewer treatment facility,in accordance with any local agreement,a permitted waste treatment facility or discharged under a permit. Product as is - Incinerate or land dispose in an approved landfill.

7 Handling and storage

HANDLING:
Normal chemical handling.
STORAGE:
Keep containers closed when not in use. Do not freeze. If frozen, thaw and mix completely prior to use.

8 Exposure controls / personal protection

EXPOSURE LIMITS

This product is not hazardous as defined by OSHA regulations.

ENGINEERING CONTROLS:
adequate ventilation
PERSONAL PROTECTIVE EQUIPMENT:
Use protective equipment in accordance with 29CFR 1910 Subpart I
RESPIRATORY PROTECTION:
A RESPIRATORY PROTECTION PROGRAM THAT MEETS OSHA'S 29 CFR 1910.134 AND ANSI Z88.2 REQUIREMENTS MUST BE FOLLOWED WHENEVER WORKPLACE CONDITIONS WARRANT A RESPIRATOR'S USE.
USE AIR PURIFYING RESPIRATORS WITHIN USE LIMITATIONS ASSOCIATED WITH THE EQUIPMENT OR ELSE USE SUPPLIED AIR-RESPIRATORS.
If air-purifying respirator use is appropriate, use any of the following particulate respirators: N95, N99, N100, R95, R99, R100, P95, P99 or P100.
SKIN PROTECTION:
rubber, butyl, viton or neoprene gloves -- Wash off after each use. Replace as necessary.
EYE PROTECTION:
splash proof chemical goggles

9 Physical and chemical properties

Spec. Grav.(70F,21C)	1.130	Vapor Pressure (mmHG)	~ 18.0
Freeze Point (F)	23	Vapor Density (air=1)	< 1.00
Freeze Point (C)	-5		
Viscosity(cps 70F,21C)	22	% Solubility (water)	100.0

Odor		Slight
Appearance		Light Yellow To Amber
Physical State		Liquid
Flash Point	P-M(CC)	> 213F > 100C
pH As Is (approx.)		4.7
Evaporation Rate (Ether=1)		< 1.00
Percent VOC:		0.0

NA = not applicable ND = not determined

10 Stability and reactivity

CHEMICAL STABILITY:
Stable under normal storage conditions.
POSSIBILITY OF HAZARDOUS REACTIONS:
Contact with water reactive compounds may cause fire or explosion.
INCOMPATIBILITIES:
May react with strong oxidizers.
DECOMPOSITION PRODUCTS:
oxides of carbon, nitrogen, phosphorus and sulfur

11 Toxicological information

No Data Available.

12 Ecological information

AQUATIC TOXICOLOGY

Daphnia magna 48 Hour Static Screen
0% Mortality= 2500; 50% Mortality= 5000 mg/L
Fathead Minnow 96 Hour Static Bioassay with 48-Hour Renewal
0% Mortality= 5000 mg/L
Menidia beryllina (Silversides) 96 Hour Static Acute Bioassay (pH adjusted)
LC50= 23100; No Effect Level= 6250 mg/L
Mysid Shrimp 48 Hour Static Acute Bioassay (pH adjusted)
LC50= 13800; No Effect Level= 6250 mg/L

BIODEGRADATION

BOD-28 (mg/g): 12
BOD-5 (mg/g): 9
COD (mg/g): 190
TOC (mg/g): 70

13 Disposal considerations

If this undiluted product is discarded as a waste, the US RCRA hazardous waste identification number is :
Not applicable.

Please be advised; however, that state and local requirements for waste disposal may be more restrictive or otherwise different from federal regulations. Consult state and local regulations regarding the proper disposal of this material.

14 Transport information

Transportation Hazard: Not Applicable
DOT: Not Regulated

DOT EMERGENCY RESPONSE GUIDE #: Not applicable
Note: Some containers may be DOT exempt, please check BOL for exact container classification
IATA: Not Regulated

IMDG: Not Regulated

15 Regulatory information

TSCA:
All components of this product are included on or are in compliance with the U.S. TSCA regulations.
CERCLA AND/OR SARA REPORTABLE QUANTITY (RQ):
No regulated constituent present at OSHA thresholds
NSF Registered and/or meets USDA (according to 1998 Guidelines):
Registration number: Not Registered
This product contains ingredients that have been determined as safe for use in systems for cooking or cooling containers of meat and/or poultry and in systems with no food contact. (G5, G7)
SARA SECTION 312 HAZARD CLASS:
Product is non-hazardous under Section 311/312
SARA SECTION 302 CHEMICALS:
No regulated constituent present at OSHA thresholds
SARA SECTION 313 CHEMICALS:
No regulated constituent present at OSHA thresholds

CALIFORNIA REGULATORY INFORMATION

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65):
This product contains one or more ingredients at trace levels known to the state of California to cause cancer and reproductive toxicity.

MICHIGAN REGULATORY INFORMATION

No regulated constituent present at OSHA thresholds

16 Other information

HMIS vII		CODE TRANSLATION
Health	1	Slight Hazard

Fire	0	Minimal Hazard
Reactivity	0	Minimal Hazard
Special	NONE	No special Hazard
(1) Protective Equipment	B	Goggles,Gloves

(1) refer to section 8 of MSDS for additional protective equipment recommendations.

CHANGE LOG

	EFFECTIVE DATE	REVISIONS TO SECTION:	SUPERCEDES
MSDS status:	05-JUN-2000		** NEW **
	15-AUG-2000	15	05-JUN-2000
	18-MAY-2001	12	15-AUG-2000
	02-AUG-2001	12	18-MAY-2001
	16-NOV-2001	12	02-AUG-2001
	25-MAR-2002	15	16-NOV-2001
	28-MAR-2002	12	25-MAR-2002
	16-APR-2002	15	28-MAR-2002
	03-JUL-2002	12	16-APR-2002
	12-FEB-2003	16	03-JUL-2002
	12-JAN-2007	2,14	12-FEB-2003
	19-JAN-2010	4,5,8,10,14	12-JAN-2007
	12-FEB-2010	14	19-JAN-2010
	21-SEP-2010	10	12-FEB-2010

Appendix E

NF Membrane Modeling Results

SUEZ Water Technologies & Solutions

Winflows Version 4.04 **DataBase Version 4.04**

Input Data Summary

Project Information

Project Name	Okeechobee Clean Energy Center
Engineer	
Location	
Mail ID	
Phone No.	
Comments	

Flowsheet Configuration

Flowsheet Type	Single Pass Flowsheet	Feed Dosing	No
Feed Stripping	No	AfterFeed Dosing	No
Product Stripping	No	Product Dosing 1	No
Raw Feed Bypass	No	Product Dosing 2	No
RO1 to RO1 Recycle	No	Interpass Pumping	No

Feed Information

Temperature, °F	60.00	RO-1: 60.00	
Feed pH :	7.72	Silt Density Index :	3.00

Feed Stream Composition(mg/L): Source - Brackish Wellwater

Calcium (Ca)	115.32	Sulfate (SO4)	26.97
Magnesium (Mg)	4.40	Chloride (Cl)	74.23
Sodium (Na)	27.29	Fluoride (F)	0.00
Potassium (K)	1.88	Nitrate (NO3)	0.29
Ammonia - N (NH4)	0.00	Bromide (Br)	0.48
Barium (Ba)	0.05	Phosphate (PO4)	1.02
Strontium (Sr)	0.71	Boron (B)	0.00
Iron (Fe)	0.05	Silica (SiO2)	15.40
Manganese (Mn)	0.06	Hydrogen Sulfide (H2S)	0.00
		Bicarbonate (HCO3)	284.38
		Carbon Dioxide (CO2)	9.01
		Carbonate (CO3)	0.76

Flow Rate Specifications

Product Flow:		60.00	gpm
Recovery %	RO1	75.00	

First Pass Array Data

					Pre-stage Pressure Change, psi		Permeate Pressure	Annual Change %	
Stage	Housing	Elements	Element Type	Element Age (yr)	Boost	Drop	psi	A-Value	B-Value
1	2	6	MUNI-NF-400	3.00	0.00	10.00	10.00	3.00	5.00
2	1	6	MUNI-NF-400	3.00	0.00	10.00	10.00	3.00	5.00

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Winflows Version 4.04 DataBase Version 4.04

Results Summary

Flow Data	gpm	Analytical Data	mg/L
Raw Feed:	80.00	**Raw Feed TDS**	553.28
Product:	60.01	**Product TDS**	106.03
Split Perm 2 Flow	19.99	**Split Perm 2 TDS**	1890.74
Concentrate:		**Concentrate TDS**	

System Data **Single Pass Design**

Temperature: °F RO-1: 60.00

System Rec. 75.01%

Average Flux (gfd), Pass and Stage

Pass	Average	Stage 1	Stage 2
Pass 1	12.00	13.75	8.51

Array Data **Pass 1**

Recovery %: 75.00 Conc. TDS(mg/l): 1890.74 Conc. Flow: 19.99 gpm

Stage	Total Housing	Total Element	Element Type	Flow, gpm Feed	Flow, gpm Perm	Pressure, psi Feed	Pressure, psi DP	Perm TDS mg/l
1	2	12	MUNI-NF-400	80.00	45.83	87.74	12.11	80.83
2	1	6	MUNI-NF-400	34.17	14.18	65.63	11.00	187.45
Total	3	18						

Analytical data

Cation	mg/l Product	mg/l Feed	mg/l Conc	Anion	mg/l Product	mg/l Feed	mg/l Conc
Ca	15.26	115.32	415.70	**SO4**	0.84	26.97	105.42
Mg	0.13	4.40	17.20	**Cl**	5.42	74.23	280.76
Na	8.37	27.29	84.08	**F**	0.00	0.00	0.00
K	0.58	1.88	5.77	**NO3**	0.02	0.29	1.10
NH4	0.00	0.00	0.00	**Br**	0.05	0.48	1.77
Ba	0.01	0.05	0.17	**PO4**	0.04	1.02	3.96
Sr	0.13	0.71	2.47	**B**	0.00	0.00	0.00
Fe	0.01	0.05	0.18	**SiO2**	15.29	15.40	15.74
Mn	0.01	0.06	0.21	**H2S**	0.00	0.00	0.00
TDS mg/l	106.03	553.28	1890.74	**HCO3**	59.87	284.38	948.53
pH	7.05	7.72	8.11	**CO2**	9.53	9.01	11.04
				CO3	0.03	0.76	7.66
Saturation Data							
BaSO4 %	2.08	71.67	**324.87**	**CaF2 %**	0.00	0.00	0.00
CaSO4 %	0.03	1.49	7.96	**SiO2 %**	12.22	12.27	12.46
SrSO4 %	0.02	0.66	2.84	**LSI**	-1.38	0.58	1.69
Struvite %	0.00	0.00	0.00	**Pi psi**	0.82	3.89	12.76

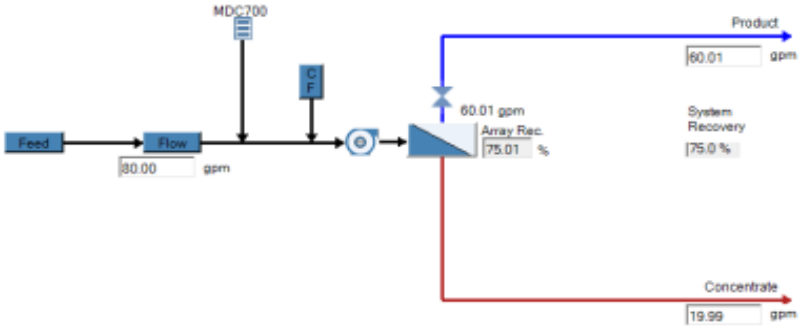
Design Notes, Errors and Warnings

Disclaimer: This projection is provided as a complimentary service and does not constitute a performance warranty.

SUEZ Water Technologies & Solutions

Winflows Version 4.04 **DataBase Version 4.04**

Process Data Sheet



Flow Data	gpm	Analytical Data	mg/L
Raw Feed:	80.00	**Raw Feed TDS**	553.28
Product:	60.01	**Product TDS**	106.03
Concentrate:	19.99	**Concentrate TDS**	1890.74

System Data		Single Pass Design
Temperature: °F	RO-1: 60.00	
		RO 1
Feed Flow to 1st Stage Housing	gpm	80.00
Feed Pressure	psi	87.74
Array Recovery	%	75.00
Permeate Flow	gpm	60.01
Split Permeate Flow	gpm	0.00

Pump Summary		
Main Pump		**RO 1**
Feed Flow	gpm	80.00
Inlet Pressure	psi	40.00
Discharge Pressure	psi	87.74
Total Efficiency	%	82.88
Power	kW	2.00
Total Power Consumption	kW	2.00

Chemical Additions

Addition (chemical as 100 %)		Kg/Day	mg/L in feed
Antiscalant in Feed *	MDC700	2.04	4.68

* Argo Analyzer calculations are based on the Winflows calculated concentrate concentrations

SUEZ Water Technologies & Solutions

Winflows Version 4.04 DataBase Version 4.04

Streams Analytical Data

Ions, mg/l		Raw Feed	RO1 Element Feed	Final RO Permeate	Product
Calcium (Ca)		115.32	115.32	15.26	15.26
Magnesium (Mg)		4.40	4.40	0.13	0.13
Sodium (Na)		27.29	27.29	8.37	8.37
Potassium (K)		1.88	1.88	0.58	0.58
Ammonia - N (NH4)		0.00	0.00	0.00	0.00
Barium (Ba)		0.05	0.05	0.01	0.01
Strontium (Sr)		0.71	0.71	0.13	0.13
Iron (Fe)		0.05	0.05	0.01	0.01
Manganese (Mn)		0.06	0.06	0.01	0.01
Sulfate (SO4)		26.97	26.97	0.84	0.84
Chloride (Cl)		74.23	74.23	5.42	5.42
Fluoride (F)		0.00	0.00	0.00	0.00
Nitrate (NO3)		0.29	0.29	0.02	0.02
Bromide (Br)		0.48	0.48	0.05	0.05
Phosphate (PO4)		1.02	1.02	0.04	0.04
Boron (B)		0.00	0.00	0.00	0.00
Silica (SiO2)		15.40	15.40	15.29	15.29
Hydrogen Sulfide (H2S)		0.00	0.00	0.00	0.00
Bicarbonate (HCO3)		284.38	284.38	59.87	59.87
Carbon Dioxide (CO2)		9.01	9.01	9.53	9.53
Carbonate (CO3)		0.76	0.76	0.03	0.03
TDS, mg/l		553.28	553.28	106.03	106.03
Flow	gpm	80.00	80.00	60.01	60.01
Temperature	°F	60.00	60.00	60.00	60.00
Pressure	psi	0.00	87.74	10.00	10.00
Hardness	ppm as CaCO3	306.10	306.10	38.63	38.63
Density	kg/m3	999.39	999.39	999.07	999.07
Ionic Strength		0.01	0.01	0.00	0.00
Osm. Pressure	psi	3.89	3.89	0.82	0.82
pH		7.72	7.72	7.05	7.05
Conductivity at 25°C	µS/cm	740.00	740.00	118.00	118.00
Saturation Data					
BaSO4	%	71.67	71.67	2.08	2.08
CaF2	%	0.00	0.00	0.00	0.00
CaSO4	%	1.49	1.49	0.03	0.03
SiO2	%	12.27	12.27	12.22	12.22
SrSO4	%	0.66	0.66	0.02	0.02
Struvite	%	0.00	0.00	0.00	0.00
LSI		0.58	0.58	-1.38	-1.38
S&DI		0.26	0.26	-1.95	-1.95

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Streams Analytical Data

Ions, mg/l		RO1 Concentrate
Calcium (Ca)		415.70
Magnesium (Mg)		17.20
Sodium (Na)		84.08
Potassium (K)		5.77
Ammonia - N (NH4)		0.00
Barium (Ba)		0.17
Strontium (Sr)		2.47
Iron (Fe)		0.18
Manganese (Mn)		0.21
Sulfate (SO4)		105.42
Chloride (Cl)		280.76
Fluoride (F)		0.00
Nitrate (NO3)		1.10
Bromide (Br)		1.77
Phosphate (PO4)		3.96
Boron (B)		0.00
Silica (SiO2)		15.74
Hydrogen Sulfide (H2S)		0.00
Bicarbonate (HCO3)		948.53
Carbon Dioxide (CO2)		11.04
Carbonate (CO3)		7.66
TDS, mg/l		1890.74
Flow	gpm	19.99
Temperature	°F	60.00
Pressure	psi	54.62
Hardness	ppm as CaCO3	1108.96
Density	kg/m3	1000.36
Ionic Strength		0.04
Osm. Pressure	psi	12.76
pH		8.11
Conductivity at 25°C	µS/cm	2373.00
Saturation Data		
BaSO4	%	**324.87**
CaF2	%	0.00
CaSO4	%	7.96
SiO2	%	12.46
SrSO4	%	2.84
Struvite	%	0.00
LSI		1.69
S&DI		1.68

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Stage Permeate Data RO 1

Permeate, mg/L		RO 1 Stage 1	RO 1 Stage 2
Calcium (Ca)		11.39	27.74
Magnesium (Mg)		0.10	0.24
Sodium (Na)		5.64	17.18
Potassium (K)		0.39	1.18
Ammonia - N (NH4)		0.00	0.00
Barium (Ba)		0.01	0.02
Strontium (Sr)		0.10	0.23
Iron (Fe)		0.00	0.01
Manganese (Mn)		0.00	0.01
Sulfate (SO4)		0.62	1.52
Chloride (Cl)		3.85	10.49
Fluoride (F)		0.00	0.00
Nitrate (NO3)		0.01	0.04
Bromide (Br)		0.04	0.09
Phosphate (PO4)		0.03	0.08
Boron (B)		0.00	0.00
Silica (SiO2)		15.24	15.44
Hydrogen Sulfide (H2S)		0.00	0.00
Bicarbonate (HCO3)		43.39	113.08
Carbon Dioxide (CO2)		9.28	10.36
Carbonate (CO3)		0.02	0.10
TDS	mg/L	80.83	187.45
Flow	gpm	45.83	14.18
Temperature	°F	15.56	15.56
Pressure	psi	10.00	10.00
Osm. Pressure	psi	0.63	1.41
pH		6.93	7.28
Conductivity at 25°C	µS/cm	86.00	220.00

SUEZ Water Technologies & Solutions

Winflows Version 4.04 DataBase Version 4.04

Element detail Data

Element By Element Data

Pass 1 Stage 1

	Elem 1	Elem 2	Elem 3	Elem 4	Elem 5	Elem 6
Flow, gpm						
Feed	40.00	35.76	31.72	27.84	24.12	20.53
Perm	4.24	4.04	3.87	3.72	3.58	3.45
Pressure, psi						
Feed	87.74	84.58	81.96	79.79	78.05	76.68
Net Driving	72.11	68.78	65.85	63.24	60.85	58.53
Delta P	3.15	2.63	2.16	1.74	1.37	1.05
Feed Osm. Press	3.89	4.29	4.76	5.32	6.03	6.93
Other						
Recovery, %	10.61	11.30	12.22	13.38	14.87	16.80
Beta (Conc. Pol.)	1.10	1.11	1.11	1.12	1.13	1.13
Flux, gfd	15.2	14.6	14.0	13.4	12.9	12.4
A-Value, µm/(s-MPa)	14.45	14.47	14.49	14.50	14.51	14.52
Permeate Ions, mg/l						
Calcium (Ca)	8.03	9.12	10.39	11.91	13.80	16.26
Magnesium (Mg)	0.07	0.08	0.09	0.10	0.12	0.14
Sodium (Na)	3.38	4.04	4.86	5.91	7.28	9.17
Potassium (K)	0.23	0.28	0.34	0.41	0.51	0.64
Ammonia - N (NH4)	0.00	0.00	0.00	0.00	0.00	0.00
Barium (Ba)	0.00	0.01	0.01	0.01	0.01	0.01
Strontium (Sr)	0.07	0.08	0.09	0.10	0.11	0.13
Iron (Fe)	0.00	0.00	0.00	0.00	0.00	0.01
Manganese (Mn)	0.00	0.00	0.00	0.00	0.01	0.01
Sulfate (SO4)	0.44	0.50	0.57	0.65	0.76	0.90
Chloride (Cl)	2.58	2.98	3.45	4.03	4.77	5.75
Fluoride (F)	0.00	0.00	0.00	0.00	0.00	0.00
Nitrate (NO3)	0.01	0.01	0.01	0.02	0.02	0.02
Bromide (Br)	0.03	0.03	0.04	0.04	0.05	0.06
Phosphate (PO4)	0.02	0.02	0.03	0.03	0.04	0.04
Boron (B)	0.00	0.00	0.00	0.00	0.00	0.00
Silica (SiO2)	15.16	15.19	15.22	15.26	15.29	15.33
Hydrogen Sulfide (H2S)	0.00	0.00	0.00	0.00	0.00	0.00
Bicarbonate (HCO3)	29.17	33.64	38.90	45.38	53.62	64.56
Carbon Dioxide (CO2)	9.02	9.09	9.19	9.31	9.47	9.71
Carbonate (CO3)	0.01	0.01	0.01	0.02	0.02	0.03
TDS, mg/l	59.19	65.99	74.01	83.87	96.41	113.06
pH	6.77	6.83	6.88	6.94	7.01	7.08
Conductivity at 25°C, µS/cm	59.00	67.00	78.00	90.00	106.00	127.00
Hardness, ppm as CaCO3	20.33	23.10	26.30	30.16	34.96	41.19
Density, kg/m3	999.03	999.04	999.04	999.05	999.06	999.07
Ionic Strength	0.00	0.00	0.00	0.00	0.00	0.00
Saturation Data						
BaSO4, %	1.06	1.21	1.39	1.61	1.88	2.24
CaF2, %	0.00	0.00	0.00	0.00	0.00	0.00
CaSO4, %	0.01	0.01	0.02	0.02	0.02	0.03
SiO2 , %	11.46	11.64	11.83	12.03	12.23	12.25
SrSO4, %	0.01	0.01	0.01	0.02	0.02	0.02
Struvite, %	0.00	0.00	0.00	0.00	0.00	0.00
LSI	-2.17	-2.01	-1.85	-1.69	-1.51	-1.31
S&DI	-2.82	-2.65	-2.47	-2.29	-2.09	-1.87

SUEZ Water Technologies & Solutions

Element detail Data

Element By Element Data

Pass 1 Stage 2

	Elem 1	Elem 2	Elem 3	Elem 4	Elem 5	Elem 6
Flow, gpm						
Feed	34.17	31.44	28.86	26.43	24.16	22.01
Perm	2.73	2.58	2.42	2.28	2.14	2.02
Pressure, psi						
Feed	65.63	63.11	60.91	58.99	57.32	55.87
Net Driving	46.42	43.52	40.86	38.42	36.15	34.01
Delta P	2.51	2.20	1.92	1.67	1.45	1.25
Feed Osm. Press	8.12	8.72	9.38	10.10	10.90	11.78
Other						
Recovery, %	8.00	8.21	8.40	8.63	8.89	9.17
Beta (Conc. Pol.)	1.09	1.08	1.07	1.07	1.07	1.07
Flux, gfd	9.9	9.3	8.8	8.2	7.8	7.3
A-Value, µm/(s-MPa)	14.61	14.63	14.64	14.66	14.67	14.68
Permeate Ions, mg/l						
Calcium (Ca)	20.88	23.30	26.15	29.36	33.01	37.19
Magnesium (Mg)	0.17	0.20	0.22	0.25	0.28	0.32
Sodium (Na)	12.26	14.00	16.04	18.35	20.97	23.96
Potassium (K)	0.85	0.97	1.10	1.26	1.44	1.65
Ammonia - N (NH4)	0.00	0.00	0.00	0.00	0.00	0.00
Barium (Ba)	0.01	0.01	0.01	0.02	0.02	0.02
Strontium (Sr)	0.17	0.19	0.21	0.24	0.27	0.30
Iron (Fe)	0.01	0.01	0.01	0.01	0.01	0.01
Manganese (Mn)	0.01	0.01	0.01	0.01	0.01	0.01
Sulfate (SO4)	1.13	1.27	1.43	1.61	1.82	2.07
Chloride (Cl)	7.60	8.60	9.79	11.15	12.72	14.55
Fluoride (F)	0.00	0.00	0.00	0.00	0.00	0.00
Nitrate (NO3)	0.03	0.03	0.04	0.04	0.05	0.06
Bromide (Br)	0.07	0.08	0.09	0.10	0.11	0.13
Phosphate (PO4)	0.06	0.06	0.07	0.08	0.09	0.11
Boron (B)	0.00	0.00	0.00	0.00	0.00	0.00
Silica (SiO2)	15.39	15.41	15.43	15.45	15.47	15.50
Hydrogen Sulfide (H2S)	0.00	0.00	0.00	0.00	0.00	0.00
Bicarbonate (HCO3)	83.81	94.19	106.33	120.02	135.52	153.17
Carbon Dioxide (CO2)	9.93	10.09	10.27	10.46	10.69	10.94
Carbonate (CO3)	0.05	0.07	0.09	0.11	0.14	0.17
TDS, mg/l	142.51	158.40	177.03	198.07	221.94	249.21
pH	7.18	7.22	7.26	7.30	7.35	7.39
Conductivity at 25°C, µS/cm	164.00	184.00	207.00	233.00	262.00	295.00
Hardness, ppm as CaCO3	52.86	59.00	66.21	74.35	83.60	94.18
Density, kg/m3	999.09	999.10	999.12	999.13	999.15	999.17
Ionic Strength	0.00	0.00	0.00	0.00	0.00	0.00
Saturation Data						
BaSO4, %	2.89	3.26	3.70	4.21	4.80	5.49
CaF2, %	0.00	0.00	0.00	0.00	0.00	0.00
CaSO4, %	0.04	0.04	0.05	0.06	0.07	0.08
SiO2 , %	12.30	12.31	12.33	12.34	12.36	12.37
SrSO4, %	0.03	0.03	0.04	0.04	0.05	0.05
Struvite, %	0.00	0.00	0.00	0.00	0.00	0.00
LSI	-1.01	-0.89	-0.75	-0.62	-0.49	-0.36
S&DI	-1.54	-1.40	-1.26	-1.11	-0.97	-0.82

Appendix F

Equipment Cut Sheets

Appendix F

Chemical Dosing Systems:

Sodium Hypochlorite

Sodium Bisulfite

Antiscalant

Flomotion Systems

H21 SERIES

INDUSTRIAL DUTY TUBING PUMPS

Designed to meet the demanding requirements of chemical injection, dispensing and transfer applications



The H21 Series pump features a unique sealed peristaltic pumphead, with optional leak detection, which protects against corrosive and dangerous chemical spills.

Exceptional self-priming capabilities make the H21 Series an ideal choice for hard-to-handle chemicals such as sodium hypochlorite, hydrogen peroxide or viscous polymers.

An extremely wide range of flow outputs can be obtained by simply changing the tubing size or pump speed.

One size pumphead accepts six standard tubing sizes. The sealed, spring-loaded pumphead rollers provide extended tubing life and automatically compensate for minor variations in pump tube wall thickness.

PERISTALTIC PUMPS



SAFETY FIRST - Sealed Pumphead Design - Tubing Rupture Detector

An optional tubing rupture detector will automatically shut down the pump and signal an alarm in the event of a tubing leak.



Together, the unique sealed pump design and the Tubing Rupture Detector help to protect operators and other equipment from potentially dangerous fumes and chemicals.

H21 SERIES FEATURES

- Flows to 48.5 GPH, Pressures to 100 psi.*
- Accepts 6 different tubing sizes
- Spring-loaded roller assembly
- Sealed pumphead
- Rugged modular design
- Seal-less pumping technology
- Self-priming – suction lifts to 30 ft.
- No check valves – few moving parts
- Dry run capability
- Selectable manual or automatic control

** Pressure rating dependent on tubing size.*

FLOMOTION H21 SERIES ENGINEERING SPECIFICATIONS

GEARMOTOR / PUMPHEAD
- 3/8HP, TEFC inverter duty, gearmotor
- Oven-cured epoxy powder coat finish.
- Stainless Steel / ABS plastic pumphead.
- Spring-loaded roller assembly
- Weight (pump & controller): 28 lbs.

K4-24 CONTROLLER
- Compact pump-mount with LED display
- Integral 8 button keypad
- Forward/Reverse capability
- NEMA 4X enclosure
- 115 / 230 VAC input 1-phase with 10' power cord
- 230VAC 3-phase output to motor
- Integral Power Disconnect (opt.)

INTERFACING
- Remote or manual speed control input (4-20mA, DC voltage or frequency)
- Start/Stop control input
- Local/Remote Select input
- Tubing Rupture input
- Pump Running output (running/stopped)
- Speed Feedback output (4-20mA)
- Status output (auto/manual)
- Fault output

H21 Series Estimated Pumping Capacity*						RPM Range: 0.8 - 225
Tubing Size (ID)	1.6mm (1/16")	3.2mm (1/8")	4.8mm (3/16")	6.4mm (1/4")	8mm (5/16")	9.6mm (3/8")
Max Pressure (psi)	100	100	80	60	30	30
ml/rev*	0.4	1.7	4.1	6.5	10.8	13.6
Flow Range GPH:	0.004 - 1.4 (0.3 - 90 ml/m)	0.01 - 6.1 (0.9 - 383 ml/m)	0.04 - 14.6 (2.8 - 923 ml/m)	0.06 - 23.2 (4 - 1,463 ml/m)	0.1 - 38.5 (8 - 2,430 ml/m)	0.1 - 48.5 (10 - 3,060 ml/m)
Continuous Duty Up To:	0.6 (40 ml/m)	2.7 (170 ml/m)	6.5 (410 ml/m)	10.3 (650 ml/m)	17.1 (1,080 ml/m)	21.6 (1,360 ml/m)
Medium Duty Up To:	1.1 (70 ml/m)	4.7 (298 ml/m)	11.4 (718 ml/m)	18.0 (1,138 ml/m)	30.0 (1,890 ml/m)	37.7 (2,380 ml/m)
Light Duty Up To:	1.4 (90 ml/m)	6.1 (383 ml/m)	14.6 (923 ml/m)	23.2 (1,463 ml/m)	38.5 (2,430 ml/m)	48.5 (3,060 ml/m)

***Recommended Use for Optimal Performance**

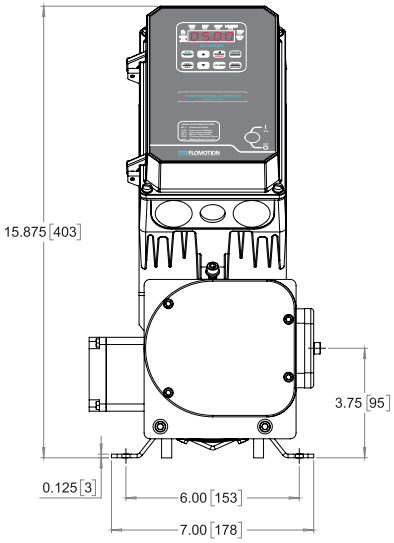
Continuous Duty Cycle:	24/7/365	100rpm max.	Run time- No limit continuous max speed.
Medium Duty Cycle:	12/7/365	175rpm max.	Run time- 6 hour continuous max speed/twice per day.
Light Duty Cycle:	1/7/365	240rpm max	Run time- 1 hour continuous max speed/once per day.

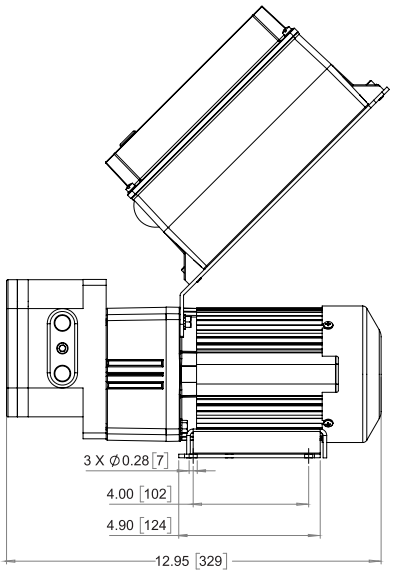
Note: Above outputs based on water at no back pressure. Actual flow rates may vary.

AGENCY APPROVALS

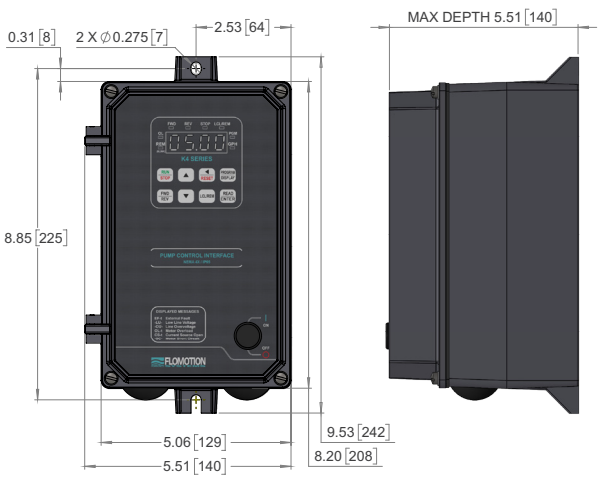
DIMENSIONS
in [mm]

H21 Series Compact Mount





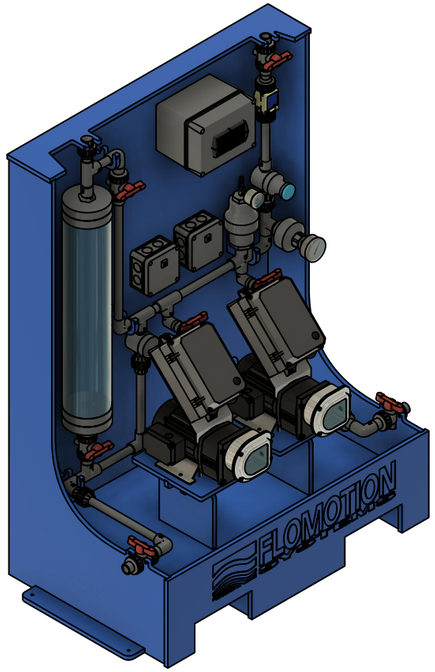
K4-24 Controller

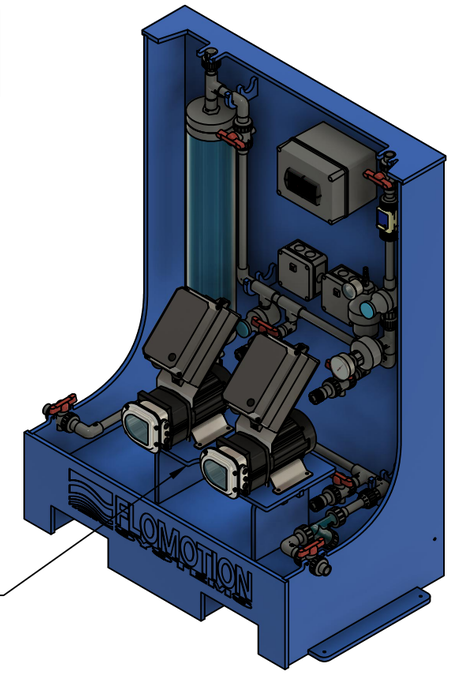


FLOMOTION SYSTEMS Inc.
3 North Main St.
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Email: Info@FlomotionSystems.com
www.FlomotionSystems.com

FLOMOTION SYSTEMS

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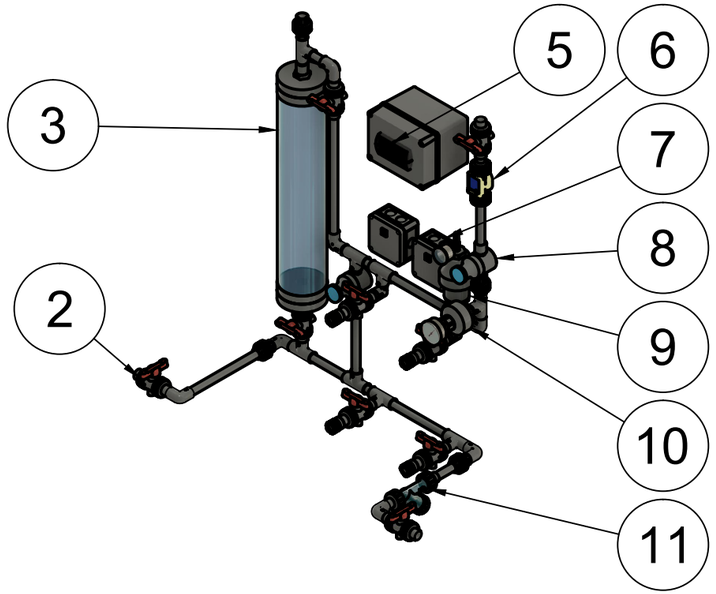




Pump Stand sized to fit H Series, V Series, or C Series Pumps. Back Up pump is optional.

The Suction Line and Clean out are reversable. The floor is sloped at 1 degree from the front to the rear and from left to right. This slope runs to a drain at the back rear of the skid.

PARTS LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL
1	2	2001HK30PX9	PERISTALTIC PUMP	STEEL
2	9	1601005	ASAHI TRUE UNION BALL VALVE	PVC/EPDM
3	1	GAN2KSE	CALIBRATION CYLINDER	PVC
5	1	PD6300-6R5	DUAL LINE LED RATE INDICATOR	STEEL
6	1	FMS	ELECTROMAGNETIC FLOW SENSOR	PVC/EPDM
7	2	TRD -1	TUBING RUPTURE DETECTOR ENCLOSURE	PLASTIC/PS
8	1	BN499P	BACK PRESSURE VALVE	PVC/PTFE
9	1	FLN12PE	PULSATION DAMPENER	PVC/EPDM
10	1	GIN160PEB	PRESSURE GAUGE/ISOLATOR (BACK MOUNT)	PVC/EPDM
11	1	XXXXX	SEDIMENT "Y" STRAINER	PVC/EPDM
35	1	P2N499P	PRESSURE RELIEF VALVE	PVC/PTFE

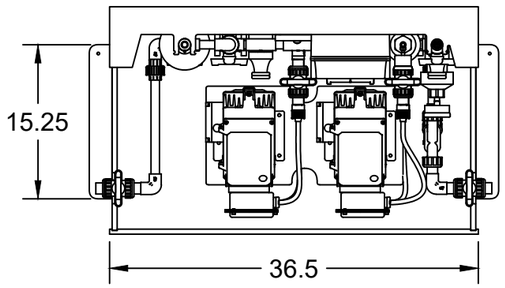


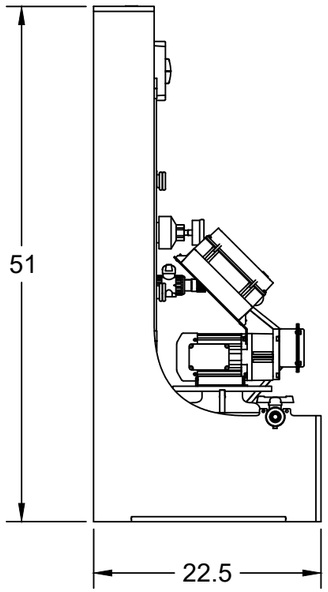
FLOMOTION SYSTEMS

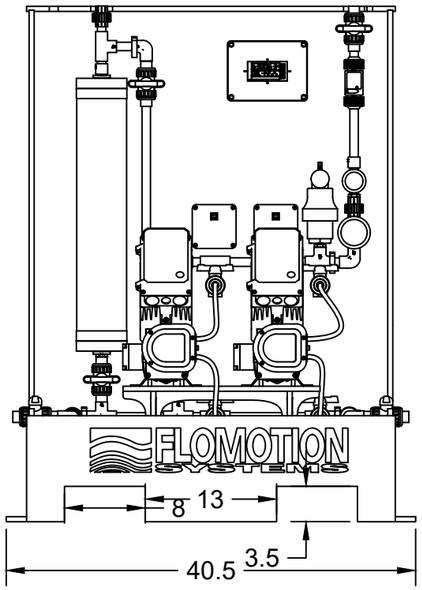
PROJECT
Flomotion

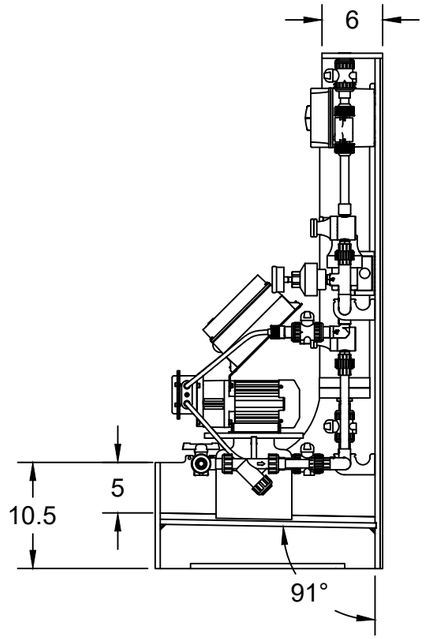
TITLE
PES12-H

APPROVED	SIZE	CODE	DWG NO	REV
CHECKED	B			
DRAWN Adam Craig 5/27/2020	SCALE 1:15	WEIGHT	SHEET 1/2	









FLOMOTION SYSTEMS	PROJECT: Flomotion			
	TITLE: PES12-H			
APPROVED	SIZE: B	CODE	DWG NO	REV
CHECKED				
DRAWN: Adam Craig 5/27/2020	SCALE: 1:15	WEIGHT	SHEET: 2/2	

Appendix F

Duplex Filter Skid

Suez

Water Technologies & Solutions
fact sheet

PRO Series pretreatment

activated carbon and multi-media filters

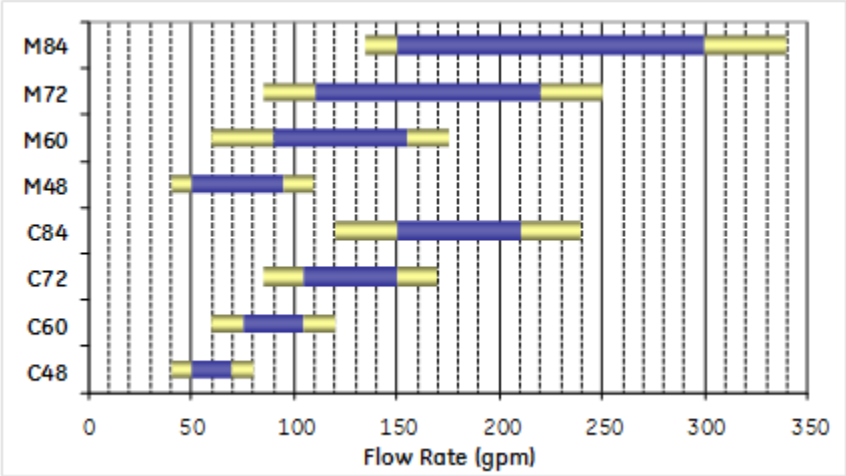
PRO Series pretreatment is designed for durable operation, easy installation and straightforward control. PRO is ideal for your industrial filtration needs with epoxy-lined carbon steel vessels, robust materials of construction, and various configuration options to suit your specific application needs. The units are also the perfect compliment to the PRO Series line of reverse osmosis systems.



general features

- Epoxy-lined carbon steel tanks, ASME code stamp at 100 psig
- Resilient seated butterfly service valves with nylon coated steel disc and stem; air actuated / spring-to-close
- Schedule 80 PVC face-piping
- 4-inch media clean out port on side of tank
- Sight glass on backwash line
- AquaMatic* 962 stager for backwash sequence control. Optional solenoid valve enclosure for remote control.
- AquaMatic controller includes communication switch for downstream equipment
- Manual or time-initiated automatic backwash
- Instrumentation: Service/backwash paddlewheel flow sensor, pre- / post- filter pressure gauges

Figure 1. PRO Series Flow Range



Find a contact near you by visiting www.suezwatertechnologies.com and clicking on "Contact Us".

*Trademark of SUEZ; may be registered in one or more countries.
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Table 1. Multi Media Specifications

Model	Conn-ections (inches)	Tank (inches)	Overall Height (inches)	Flow** (gpm)			Media Volume (cubic feet)					
				Min	Max	BkWsh*	Anthracite	Silica Sand	Garnet	Fine Gravel	Med Gravel	Coarse Gravel
M48	3	48x72	122	40	110	185	18	12	6	2	2	Top of Under Drain
M60	4	60x72	125	60	175	290	28	19	9	3	3	
M72	4	72x72	130	85	250	400	41	27	14	5	5	
M84	6	84x72	134	135	340	570	56	38	19	7	7	

* Backwash flow rates are for 15 gpm/ft² loading at 60°F. Flow rate will increase with increase in water temperature.
** Flow rates shown are for MMF systems with no coagulant addition/air scour. Flow rates with coagulant addition must be reduced to 3-5 gpm/ft².

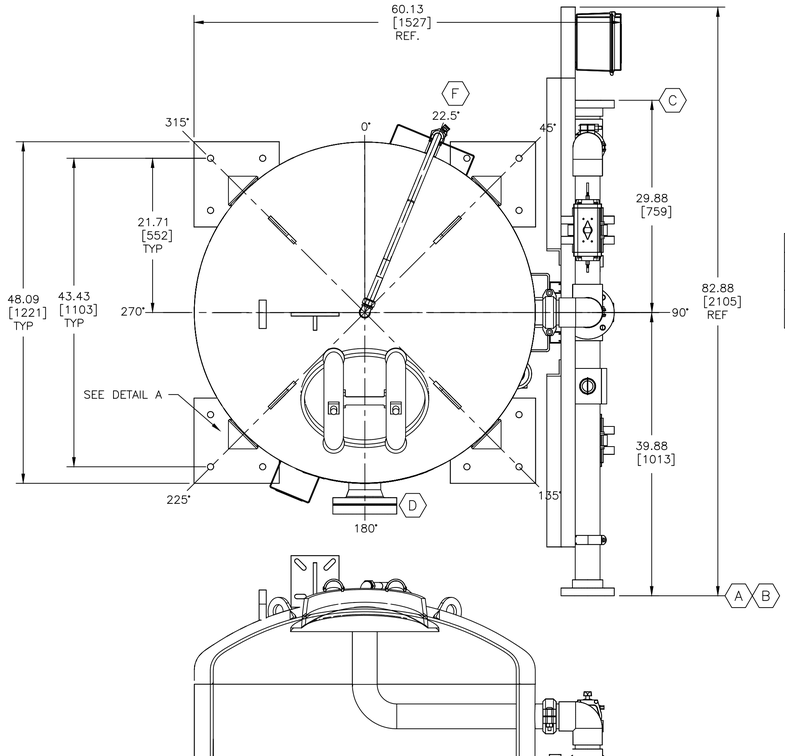
Table 2. Activated Carbon Filter Specifications

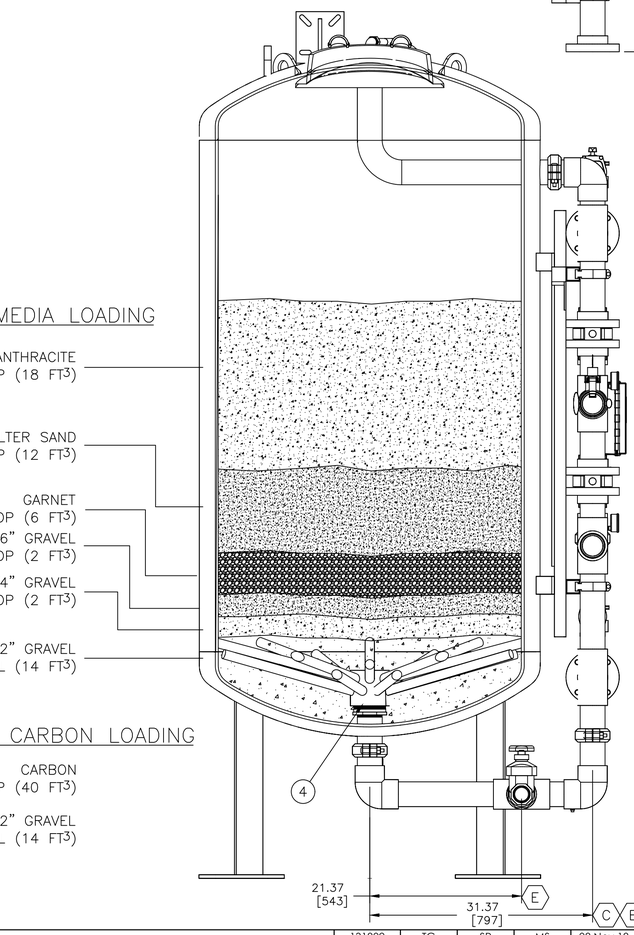
Model	Connas-ections (inches)	Tank (inches)	Overall Height (inches)	Flow** (gpm)			Media Volume (cubic feet)	
				Min	Max	BkWsh*	Activated Carbon	Coarse Gravel
C48	3	48x72	122	40	80	185	40	Top of Under Drain
C60	4	60x72	125	60	120	290	60	
C72	4	72x72	130	85	170	420	85	
C84	6	84x72	134	120	240	570	120	

* Backwash flow rates are for 13.5 gpm/ft² loading at 60°F for 40% bed expansion. Flow rate will increase with increase in water temperature.
** Based on Chlorine removal only. For TOC removal, the max flow should be reduced by half.

Table 3. Part Numbers (Media Sold Separately)

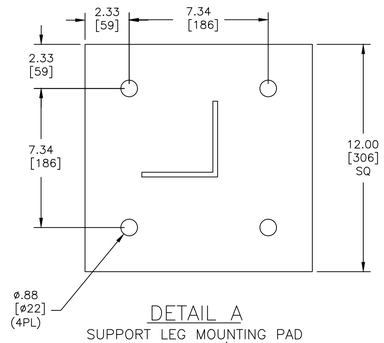
Model	Stager / PVC
C/M48	3023927
C/M60	3023928
C/M72	3023929
C/M84	3023930



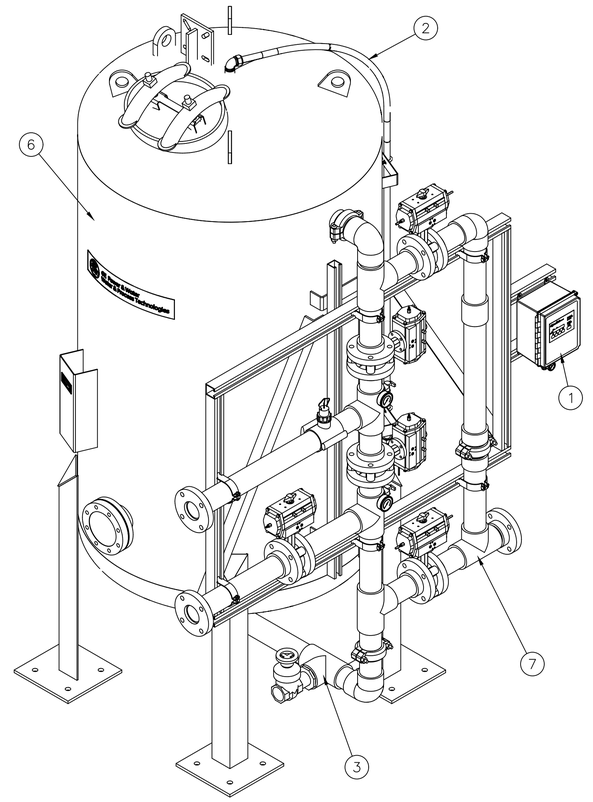


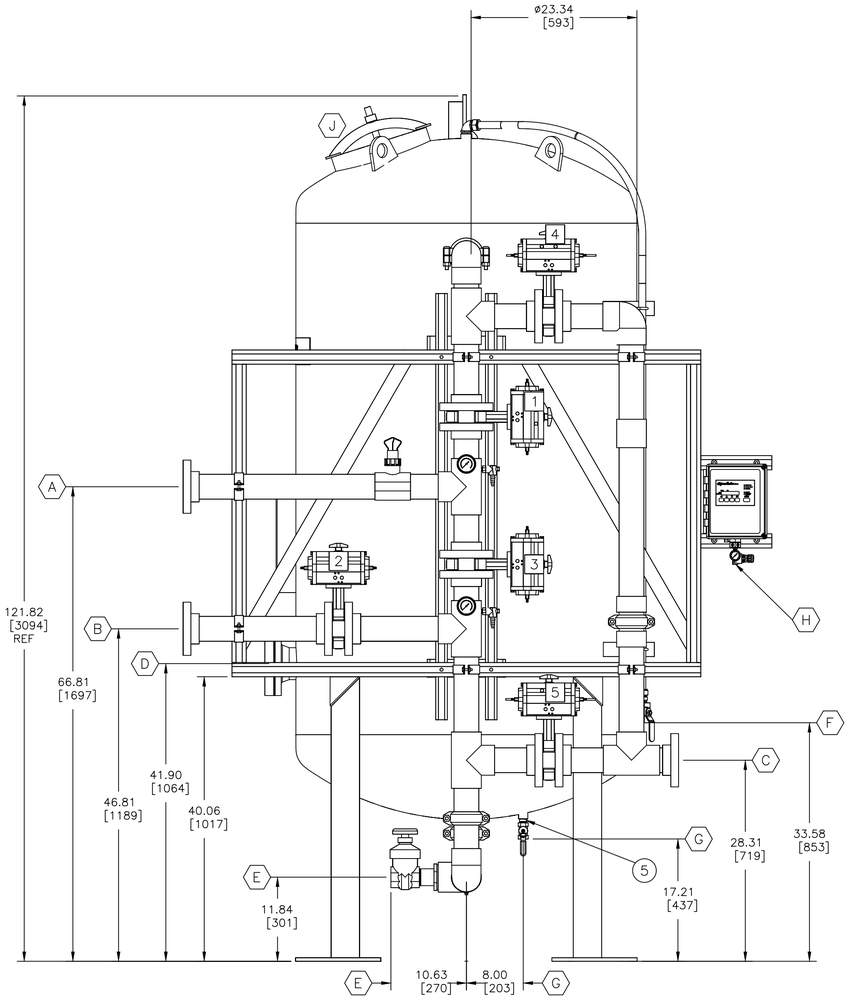
VALVE NUMBER	DESCRIPTION
1	SERVICE INLET VALVE
2	SERVICE OUTLET VALVE
3	BACKWASH INLET VALVE
4	BACKWASH OUTLET VALVE
5	RINSE OUTLET VALVE

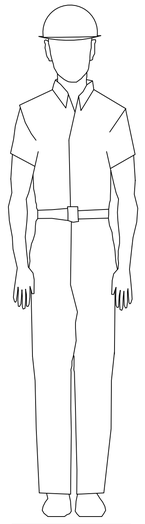
FILTER FUNCTION	VALVES OPEN
SERVICE	AOV–1, AOV–2
BACKWASH	AOV–3, AOV–4
SETTLE	---
RINSE	AOV–1, AOV–5



DETAIL A
SUPPORT LEG MOUNTING PAD
SCALE: 1/4







NOTES:

1. CONNECTION TABLE

ITEM	DESCRIPTION	TYPE	SIZE
A	SERVICE INLET	150# RF FLG	3.00"
B	SERVICE OUTLET	150# RF FLG	3.00"
C	BACKWASH/RINSE OUTLET	150# RF FLG	3.00"
D	MEDIA REMOVAL PORT	150# RF FLG	4.00"
E	PRIMARY TANK DRAIN	150# RF FLG	2.00"
F	TANK VENT	FNPT	1.00"
G	SECONDARY TANK DRAIN	FNPT	0.75"
H	AIR INLET (80PSIG MIN. REQ.)	FNPT	0.25"
J	MANWAY W/EPDM GASKET	CRAB	14X18

2. SHIPPING WEIGHT MM – 7,625 LB/[3466 Kg]; AC–5,575 LB/[2534 Kg].
3. OPERATING WEIGHT MM – 10,050 LB/[4568 Kg]; AC – 8,835 LB/[4016 Kg].
4. EQUIPMENT & PLUMBING TABLE:

FIND NO.	PART NUMBER	QTY.	DESCRIPTION	U/M
1	1079471	1	962,48–00,INV,N4XFG,115VAC,RELAY	EA
2	1220618	1	PLMB,VENT,MM,316,1.00	EA
3	1227983	1	PLMB,LWR PLMB,MM–48,PVC,3.00"	EA
4	1227990	1	PLMB,LWR DISTRIB,MM–48,PVC	EA
5	1228727	1	PLMB,DRAIN,MM,316,0.75	EA
6	3023901	1	TANK,FILTER/WS,CS,48" DIA X 72"	EA
7	3024320	1	PLMB,FACE ASSY,MM/AC,PVC,CS,3.00,STAGER	EA

5. ALL PIPING & EQUIPMENT SHOWN TO BE FULLY SUPPORTED BY SUEZ PRODUCTION.
6. ALL INTERCONNECTING PIPING SHALL BE FULLY & INDEPENDENTLY SUPPORTED BY OTHERS.
7. ALL DIMENSIONS IN INCHES [MM].
8. REFERENCE – PIPING AND INSTRUMENTATION DIAGRAM: 1303278.
9. APPROXIMATE TIP HEIGHT 127.00 INCHES.

REV	DESCRIPTION	ECO	DWN	APPR	APPR	DATE
K	SUEZ REBRANDING	131802	TG	SR	MS	08 Nov 18
J	VENT PLMB UPDATION	16733	JPG	TA	JM	09OCT15
I	LOWERED NOZZLE 3A IN TANK BY 2"	16538	RN	CJ	BRB	20APR15
H	REMOVED FLOW METER	16257	JNB	JB	BRB	22AUG14
G	UPDATED TANK	15643	PFM	RLD	PWG	11DEC13

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TOLERANCES UNLESS NOTED
DECIMALS .X .XX .50 .XXX
ANGLES 1 FRAC N/A

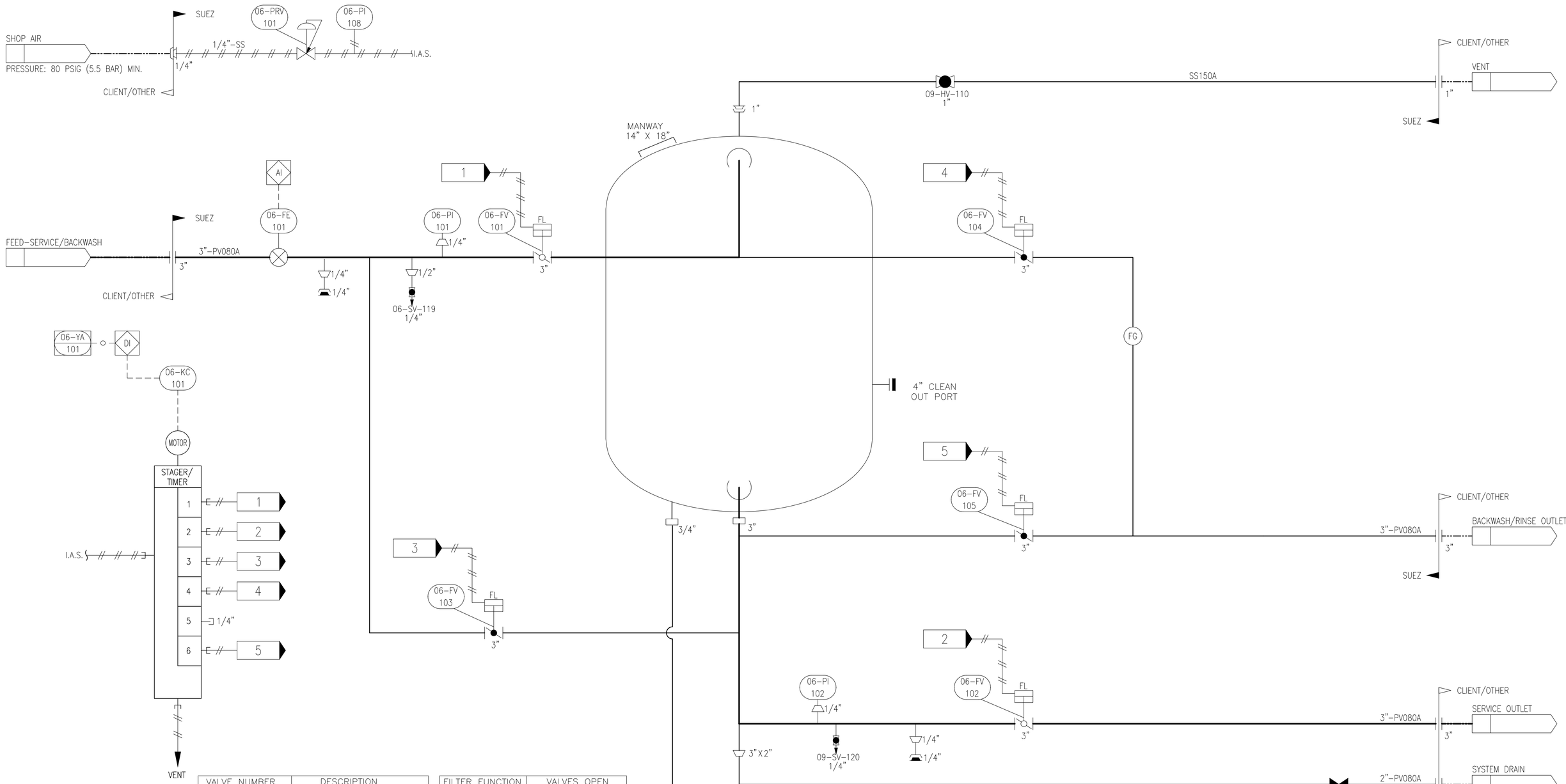
CUSTOMER INFORMATION

GA,FLT-MM/AC,
48X72,CS/PVC,STAGER,60

DRAWING NUMBER	REVISION
1303387	K
REF.: -	DOC. OWNER:
PROJECT NO.	PART/MATERIAL NO. 3023927
SCALE 3:32	SIZE D
SHEET 1 OF 1	

FILE LOCATION: C:\Users\212724458\appdata\local\temp\AcPublish_16A\1303387.dwg

LAST SAVED: November 8, 2018 2:43:08 PM



VALVE NUMBER	DESCRIPTION
FV-101	SERVICE INLET VALVE
FV-102	SERVICE OUTLET VALVE
FV-103	BACKWASH INLET VALVE
FV-104	BACKWASH OUTLET VALVE
FV-105	RINSE OUTLET VALVE

FILTER FUNCTION	VALVES OPEN
SERVICE	FV-101, FV-102
BACKWASH	FV-103, FV-104
SETTLE	---
RINSE	FV-101, FV-105

ONE (1) 100% - MEDIA FILTER TANK
TAG: 06-MMF-101
48" DIAMETER 72" STRAIGHT SHELL
100 PSI ASME CODE, NON CODE STAMPED

NOTE:
1. P&ID LEGEND PAGE: 1303984

REV	DESCRIPTION	ECO	DWN	APPR	APPR	DATE
G	SUEZ REBRANDING	131802	VE	SR	MS	08 Nov 18
F	REMOVED FLOW METER	16257	JNB	JNB	BRB	22AUG14
E	REVISED PER ECO	15643	PFM	JNB	BRB	05DEC13
D	REMOVED BACKWASH OUTLET ORIFICE	15284	STN	JB	BRB	15OCT12
C	CHANGED STAGER TIMER NUMBER	14240	PAS	BJB	BRB	15MAR10

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TOLERANCES UNLESS NOTED
DECIMALS ANGLES
.X
.XX FRAC
.XXX

CUSTOMER INFORMATION

P&ID, MM/AC-48X72,
CS/PVC, STAGER, 60HZ

DRAWING NUMBER	REVISION
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REF.: -	DOC. OWNER:

PROJECT NO.	PART/MATERIAL NO.	SCALE	SIZE	SHEET
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Inversand Company
SINCE 1925
226 Atlantic Avenue, P.O. 650 • Clayton, NJ 08312
Phone 856-881-2345 Fax 856-881-6859
Email: info@inversand.com • www.inversand.com

GREENSANDplus™

Performance Media for Water Filtration

Removes iron, manganese, hydrogen sulfide, arsenic and radium.

GreensandPlus™ is a black filter media used for removing soluble iron, manganese, hydrogen sulfide, arsenic and radium from groundwater supplies.

The manganese dioxide coated surface of GreensandPlus acts as a catalyst in the oxidation reduction reaction of iron and manganese.

The silica sand core of GreensandPlus allows it to withstand waters that are low in silica, TDS and hardness without breakdown.

GreensandPlus is effective at higher operating temperatures and higher differential pressures than standard manganese greensand. Tolerance to higher differential pressure can provide for longer run times between backwashes and a greater margin of safety.

Systems may be designed using either vertical or horizontal pressure filters, as well as gravity filters.

GreensandPlus is a proven technology for iron, manganese, hydrogen sulfide, arsenic and radium removal. Unlike other media, there is no need for extensive preconditioning of filter media or lengthy startup periods during which required water quality may not be met.

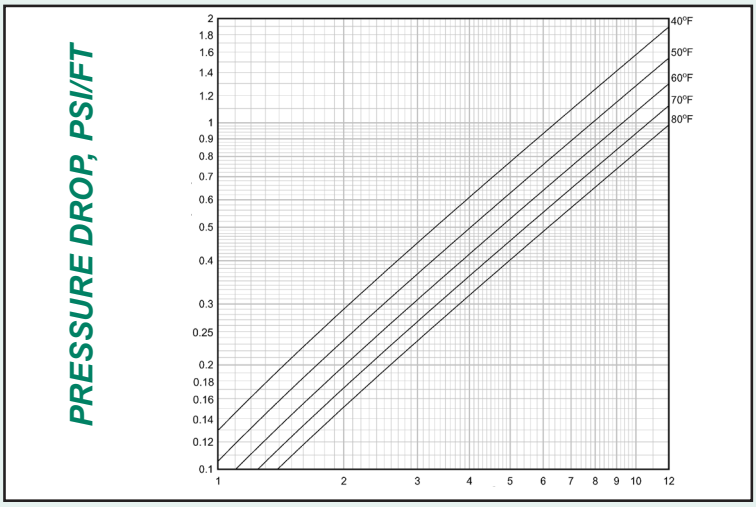
GreensandPlus is an exact replacement for manganese greensand. It can be used in CO or IR applications and requires no changes in backwash rate or times or chemical feeds.

GreensandPlus has the WQA Gold Seal Certification for compliance with NSF/ANSI 61.

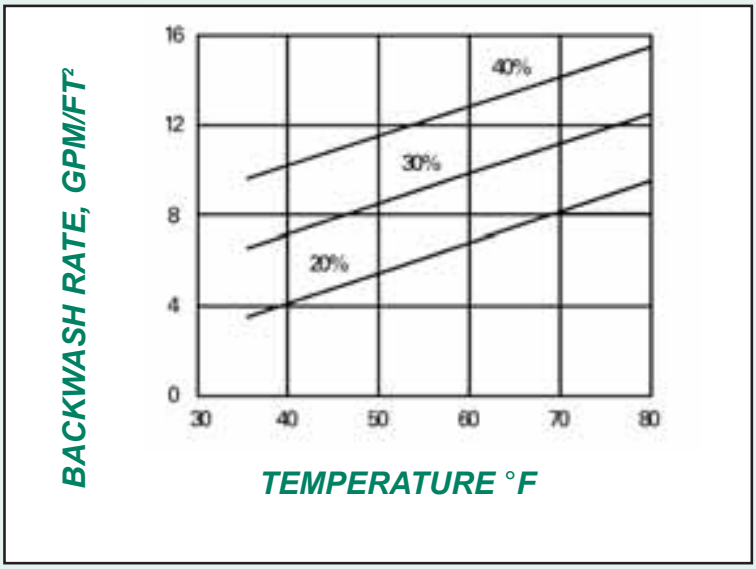
REACH Registration 01-2119452801-43-0020 for import to the EU.

Packaging is available in 1/2 cubic foot bags or 1 metric ton (2,205 lbs) bulk sacks.

GREENSANDPLUS PRESSURE DROP (CLEAN BED)



BED EXPANSION DURING BACKWASHING



PHYSICAL CHARACTERISTICS

Physical Form
Black, nodular granules shipped in a dry form

Apparent Density
88 pounds per cubic foot net (1410.26 kg/m3)

Shipping Weight
90 pounds per cubic foot gross (1442.31 kg/m3)

Specific Gravity
Approximately 2.4

Porosity
Approximately 0.45

Screen Grading (dry)
18 X 60 mesh

Effective Size
0.30 to 0.35 mm

Uniformity Coefficient
Less than 1.60

pH Range
6.2-8.5 (see General Notes)

MaximumT emperature
No limit

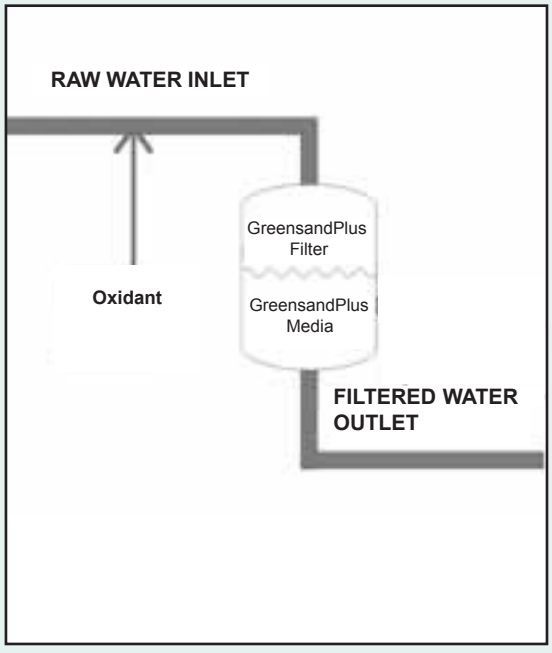
Backwash Rate
Minimum 12 gpm/sq. ft. at 55°F (29.4 m/hr @ 12.78°C) (see expansion chart)

Service Flow Rate
2 -12 gpm/sq. ft (4.9m/hr - 29.4 m/hr)

Minimum Bed Depth
15 inches (381 mm) of each media for dual media beds or 30 inches minimum (762 mm) of GreensandPlus alone.

METHOD OF OPERATION CO

GreensandPlus: Catalytic Oxidation (CO)



Catalytic Oxidation (CO) operation is recommended in applications where iron removal is the main objective in well waters with or without the presence of manganese. This method involves the feeding of a predetermined amount of chlorine (Cl_2) or other strong oxidant directly to the raw water before the GreensandPlus Filter.

Chlorine should be fed at least 10-20 seconds upstream of the filter, or as far upstream of the filter as possible to insure adequate contact time. A free chlorine residual carried through the filter will maintain GreensandPlus in a continuously regenerated condition.

For operation using chlorine, the demand can be estimated as follows:

mg/L Cl_2 = (1 x mg/L Fe) + (3 x mg/L Mn) + (6x mg/L H_2S) + (8 x mg/L NH_3)

SUGGESTED OPERATING CONDITIONS

Bed Type

Dual media: anthracite 15-18 in. (381 mm - 457 mm) and GreensandPlus 15-24 in. (381 mm - 610 mm)

Capacity

700-1200 grains of oxidized iron and manganese/sq.ft. of bed area based on oxidant demand and operation to iron break through or dp limitations.

Backwash

Sufficient rate using treated water to produce 40% bed expansion until waste water is clear, or for 10 minutes, whichever occurs first.

Air/Water Scour

Optional using 0.8-2.0 cfm/sq. ft. (15 m/hr - 7 m/hr) with a simultaneous treated water backwash at 4.0-4.5 gpm/sq. ft. (9.8 m/hr - 11.03 m/hr).

Raw Water Rinse

At normal service flow rate for 3 minutes or until effluent is acceptable.

Flow Rate

Recommended flow rates with CO operation are 2-12 gpm/sq. ft. (4.9 m/hr - 29.4 m/hr). High concentrations of iron and manganese usually require lower flow rates for equivalent run lengths. Higher flow rates can be considered with very low concentrations of iron and manganese. For optimizing design parameters, pilot plant testing is recommended.The run length between backwashes can be estimated as follows:

What is the run length for a water containing 1.7 mg/L iron and 0.3 mg/L manganese at a 4 gpm/sq. ft. service rate:

Contaminant loading

= (1 x mg/L Fe) + (2 x mg/L Mn)
= (1 x 1.7) + (2 x 0.3)
= (2.3 mg/L or 2.3/17.1 = 0.13 grains/gal. (gpg)

At 1,200 grains / sq. ft. loading ÷ 0.13 gpg = 9,230 gal./sq. ft.

At 4 gpm / sq. ft. service rate 9,230/4 = 2,307 min.

The backwash frequency is approximately every 32-38 hours of actual operation.

The Intermittent regeneration (IR) operation is available for certain applications. Contact your Inversand representative for additional information.

GENERAL NOTES

pH

Raw waters having natural pH of 6.2 or above can be filtered through GreensandPlus without pH correction. Raw waters with a pH lower than 6.2 should be pH-corrected to 6.5-6.8 before filtration. Additional alkali should be added following the filters if a pH higher than 6.5-6.8 is desired in the treated water. This prevents the possible adverse reaction and formation of a colloidal precipitate that sometimes occurs with iron and alkali at a pH above 6.8.

Initial Conditioning of GreensandPlus

GreensandPlus media must be backwashed prior to adding the anthracite cap. The GreensandPlus backwash rate must be a minimum of 12 gpm/sq. ft. @ 55°F.

After backwashing is complete, the GreensandPlus must be conditioned. Mix 0.5 gal. (1.9 L) of 6% household bleach or 0.2 gal (0.75 L) of 12% sodium hypochlorite for

Initial Conditioning of GreensandPlus

every 1 cu. ft. (28.3 L cu. m) of GreensandPlus into 6.5 gallons (25 L) of water.

Drain the filter enough to add the diluted chlorine mix. Apply the diluted chlorine to the filter being sure to allow the solution to contact the GreensandPlus media. Let soak for a minimum of 4 hours, then rinse to waste until the “free” chlorine residual is less than 0.2 mg/L. The GreensandPlus is now ready for service.

Radium and Arsenic Removal Using GreensandPlus

The GreensandPlus CO process has been found to be successful in removing radium and arsenic from well water. This occurs via adsorption onto the manganese and/or iron precipitates that are formed. For radium removal, soluble manganese must be present in or added to the raw water for removal to occur. Arsenic removal requires iron to be present in or added to the raw water to accomplish removal. Pilot plant testing is recommended in either case.

REFERENCES

USA

American Water Company, CA
San Jacinto, CA
City of Tallahassee, FL
Adedge Technologies, Inc., Buford, GA
City of Mason City, IL
City of Goshen, IN
City of Hutchinson, KS
City of Burlington, MA
Dedham Water Co., MA
Raynham Center, MA
Northbrook Farms, MD
Sykesville, MD
Tonka Equipment Company, Plymouth, MN
City of New Bern, NC
Onslow County, NC
Hungerford & Terry, Inc., Clayton, NJ
Fort Dix, NJ
Jackson Twsp. MUA, NJ

USA

Churchill County, NV
Suffolk County Water Authority, NY
City of Urbana, OH
Roberts Filter Group, Darby, PA

International

Watergroup, Saskatoon, SK Canada
BI Pure Water, Surrey, BC Canada
Sydney, Nova Scotia, Canada
PT Beta Pramesta, Jakarta, Indonesia
PT Besflo Prima, Jakarta, Indonesia
Eurotrol, Milanese, Italy
Gargon Industrial, Mexico City, Mexico
River Sands Pty. Ltd., Queensland, Australia
Filtration Tech, Auckland, New Zealand
Alamo Water Poland, Izabeln, Poland
Aquatrol Company, Moscow, Russia
Impulse Group, St. Petersburg, Russia
Brenntag Nordic, Taby, Sweden
EcoFilter Technology, Liechtenstein





The manufacturing of GreensandPlus is an ongoing, 24/7 process to ensure the highest quality water treatment media.

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Appendix F

Nanofiltration Skid

Suez

Membrane System

Model	RO-PROflex,18-2
Part Number	Configure to Order

Performance Data

Design Permeate Flow	60 gpm
Feed Flow	80.00 gpm
Concentrate Feed Flow	20.00 gpm
Recovery	75 %
Design Temperature	60 °F
System Inlet Pressure	30 psi
System Operating Pressure	240 psi
Design pH	5.5 - 8.5

Components

Cartridge Filtration

Housing Quantity	1
Housing Model, Manufacturer	HSG-FLT,FRP,1RD,3.0MC,40,HFZ,100PSI,ROPV
Cartridge Filter Model	FLT,CTG,DEPTH,HF.RO.ZS 01-40-FSE,Melt-blown polypropylene
Rating, Length	1-micron nominal, 40-inches
Filter Quantity	1
Valves	Pre-filter manual isolation, post filter auto isolation, vent and drain
TIES of Filter	28

Membrane Element Housings

Membrane Housing Model	450P-8
Housing Manufacturer	Codeline or Equal
Number of Housings	3
Housing Length	6
Housing Diameter	8
Banking Arrangements	2-1

High-Pressure Pump

Model	SS12508
Manufacturer	SUEZ / Tonkaflo
Quantity	1
Motor Size and Type	25 hp,TEFC
Motor FLA	Refer to electrical drawing for rated amps

Rev: 1.0, Presentation Date: Sep 16,2022 Valid until: Oct 16,2022

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Membrane Elements	
Model	HL8040F-400(Shipped Separately)
Manufacturer	SUEZ
Quantity	18
Membrane Type	FRP Wrapped, PA

Material of Constructions

Filter Housing	FRP,White
Feedwater Piping	Schedule 80, PVC
High-Pressure Piping	316 Stainless Steel, Sch. 10,Mill Finish
Permeate Piping	Schedule 80, PVC,
High-Pressure Pump Housing	316 Stainless Steel,Mill Finish
High-Pressure Pump Internals	See Pumptools.com for specific pump selected
Membrane Element Housings	FRP,White
Frame	Carbon steel,Epoxy-coated blue finish
Pneumatic Tubing	Polyethylene Tubing
Fittings and Couplings	Galvanized
Materials of Construction Note	Please consult with SUEZ Water if the feed water to the RO system has a concentration more than 350 mg/l of chloride as ion to verify the materials of construction proposed have adequate corrosion resistance. Please provide minimum, maximum, and average levels of Chloride, Sulfate, pH, and Temperature of the feedwater solution.

Installation and Utility Requirements

Inlet	3 inch, Flange
Permeate	2 inch, Flange
Concentrate	1.5 inch, Flange
Inlet (CIP)	3 inch, Flange
Permeate (CIP)	2 inch, Flange
Concentrate (CIP)	1.5 inch, Flange
Compressed Air	0.375 inch FPT
Inlet Water Pressure	30 psi
Compressed Air Requirement	80 psi (5.5 Bar) minimum oil-free
Drain to be Sized for	80.00 gpm
Motor Power	460VAC, 3-phase, 60Hz,40
Control Circuit	120V-220V, 1-phase, 60Hz
Skid (H X W X D)	94 X 274 X 50
Shipping Weight Estimate	5000 lbs

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Controls / Electrical Systems

Components

Processor	PLC - AB CompactLogix
Enclosure	NEMA 4,RO Skid Mounted
Operator Interface	PanelView Plus® 700
Communications	Ethernet
Conduit	Single and three-phase power wire in liquid-tight flexible conduit. Low voltage signal wire shall be provided in shielded multiconductor cable per NFPA 79. Wires to be run in central cable tray.
Control Screens Included	
	Security access screen
	System overview
	System data display
	Alarm history
	Individual component display of operational status, 4-20 mA instruments and control
	Alarm status and indication
	Alarm description
	Set point screens
Chlorine Monitor	
	SIGNET 4630 FREE CHLORINE ANALYZER WITH PH SENSOR AND 4-20mA OUTPUT
VFDs,Starters and Disconnect	
	VFD and Fused Disconnect DISCONNECT-SWITCH,600V,60A,N4X,FUSED FUSE-FAST,600V,CLASS J,50A,BUS (VFD,18.5KW,380-480V,IP66,RFI,DANFOSS

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Instrumentation

Instrument	Display	Manufacturer	Location
Instrument Center		N/A	N/A
Flow Meters	HMI	GF Signet 2537	Permeate, concentrate
Pressure Switch	HMI	United Electric Spectra 10	Feed, permeate, concentrate
Pressure Transmitter	HMI	E+H PMC11	Primary, Final
Pressure Gauge	Local indication	Ashcroft or equal	Pre-filter, post-filter, primary, final, interstage, permeate, concentrate, pump discharge
Conductivity	HMI	GF Signet 2850	Permeate, Feed
pH Meter	HMI	GF Signet 2724/2750	Feed
ORP	N/A	N/A	Feed
Temperature	HMI	GF Signet 2850	Feed

Note, if ORP option is chosen, it is mandatory to confirm the feedwater feeding the RO system is free of oxidizing material such as free and total chlorine. A daily manual confirmation or use of a calibrated online free or total chlorine analyzer is required. ORP analyzers may be used as supplemental notification but are not reliable enough to protect the membranes from oxidization damage. The SUEZ warranty does not cover membrane oxidation damage due to faulty ORP instrument readings.

Membrane System Alarms

Low Inlet Pressure

High/Low pH
High Temperature
High Permeate Pressure
High Concentrate Pressure

Additional Comments

Allen-Bradley processor and components

Electronic copy of program

Pre-filter cartridge filter housing mounted on the membrane skid

High-pressure pump mounted on the membrane skid

UL 508 / cUL Approval

Full permeate flush on shutdown

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Low voltage control panel mounted on RO skid

Note: Motor starters are not included in base price (purchased separately)

O&M Manual, Electrical, General Dimensional, and Process and Instrumentation Drawings included.

Option only available on two stage array machines. Includes Victaulic style connection points and loose ship hose spools to allow cleaning stage 1 and stage 2 membranes independently under low pressure. The cleaning design uses the existing valve and branch connections to and from the RO machine for full system CIP. This allows user to perform either a full system CIP or individual stage CIP by connecting hoses to the appropriate points.CIP connection points located downstream of the cartridge prefilter, stage 1 feed after high pressure pump, between stage 1 and stage 2, after stage 2 before the concentrate control valve, and after the concentrate control valve.

Accessories

Clean-in-Place :

CIP System Factory Assembled and Skid Mounted	PROflex 18/24 CIP-SKID

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HL series

water softening NF elements

Water Technologies & Solutions
fact sheet

The H-Series proprietary thin-film nanofiltration membrane elements are characterized by an approximate molecular weight cut-off of 150-300 daltons for uncharged organic molecules. Divalent and multivalent ion rejection is dependent upon feed concentration and composition.

HL Nanofiltration Elements are used for water softening, color removal, and reduction of THM formation potential.

Table 1: Element Specification

Membrane	H-Series, Thin-film membrane (TFM*)

Model	Average permeate flow gpd (m^3/day) (1)(2)	Average $MgSO_4$ rejection (1)(2)	Minimum $MgSO_4$ rejection (1)(2)
HL2540FM	780 (3.0)	98.0%	95.0%
HL4040FM	2,500 (9.5)	98.0%	95.0%
HL8040F 365	11,000 (41.6)	98.0%	95.0%
HL8040F 400	12,000 (45.4)	98.0%	95.0%

(1) Average salt rejection after 24 hours of operation. Individual flow rate may vary ±20%.
(2) Testing conditions: 2,000ppm MgSO4 solution at 110psi (760kPa) operating pressure, 77°F, pH7.5 and 15% recovery.

Model	Active area ft^2 (m^2)	Outer wrap	Part number
HL2540FM	27 (2.5)	Fiberglass	1207230
HL4040FM	90 (8.4)	Fiberglass	1207236
HL8040F 365	365 (33.9)	Fiberglass	1266702
HL8040F 400	400 (37.2)	Fiberglass	1207240

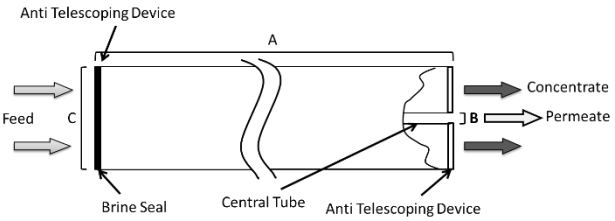


Figure 1 : Element Dimensions Diagram (Female)

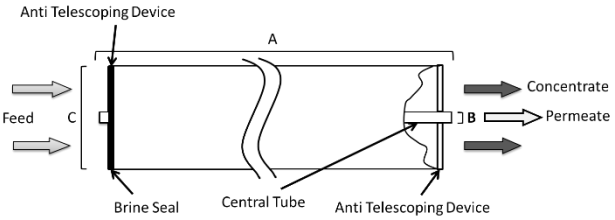


Figure 2: Element Dimensions Diagram (Male)

Table 2: Dimensions and Weight

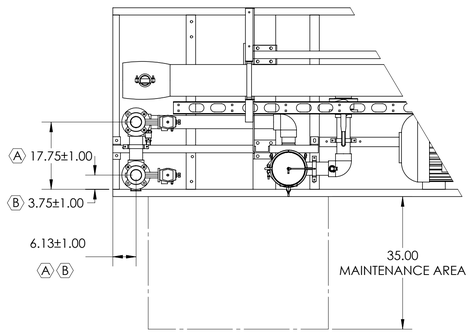
Model	Type	Dimensions, inches (cm)			Boxed
		A	B	C[3]	Weight lbs. (kg)
HL2540*	Male	40.0 (101.6)	0.75 (1.90)	2.4 (6.1)	5 (2.3)
HL4040*	Male	40.0 (101.6)	0.75 (1.90)	3.9 (9.9)	8 (3.5)
HL8040*	Female	40.0 (101.6)	1.125 (2.86)	7.9 (20.1)	32 (14.5)

Table 3: Operating and CIP parameters

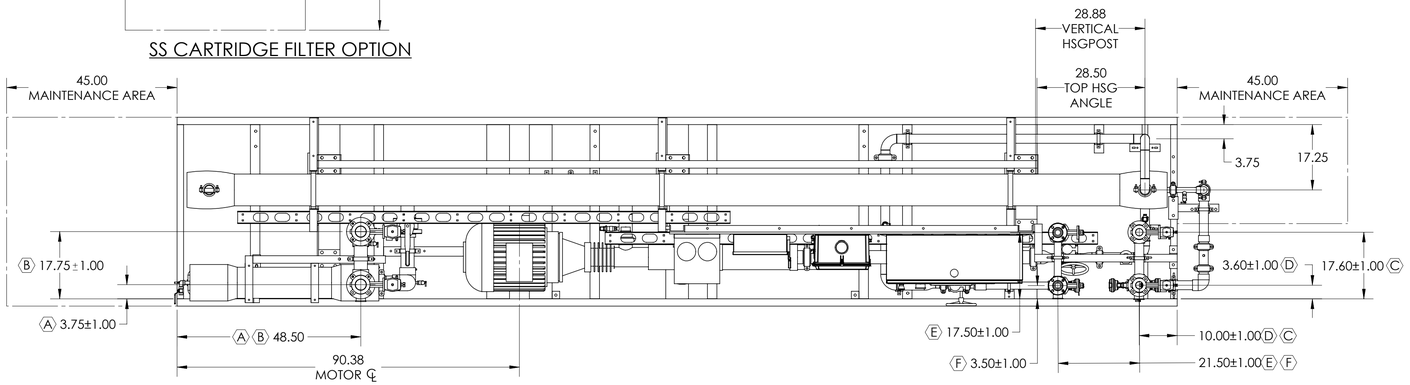
Typical Operating Pressure	70-300psi (483-2,069kPa)
Typical Operating Flux	10-20GFD (15-35LMH)
Maximum Operating Pressure	Tape elements: 450psi (3,103kPa) Other outer wrap: 600psi (4,140kPa)
Maximum Temperature	Continuous operation: 122°F (50°C) Clean In Place (CIP): 104°F (40°C)
pH Range	Optimum rejection: 6.0-7.0, Continuous operation: 3.0-9.0, Clean In Place (CIP): 2.0-11.0 (1)
Maximum Pressure Drop	Over an element: 12psi (83kPa) Per housing: 50psi (345kPa)
Chlorine Tolerance	1,000+ ppm x hours, dechlorination recommended
Feedwater	NTU < 1 SDI_{15} < 5

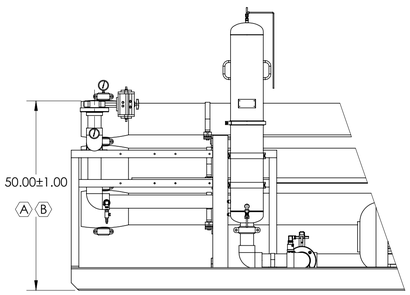
(1) Please refer to Cleaning Guidelines Technical Bulletin TB1194.

CONNECTION TABLE			
ITEM	DESCRIPTION	TYPE	GPM __ SIZE
A	INLET	150# RF FLG	3.00
B	INLET CIP	150# RF FLG	3.00
C	PERMEATE OUTLET	150# RF FLG	2.00
D	PERMEATE CIP OUTLET	150# RF FLG	2.00
E	CONCENTRATE OUTLET	150# RF FLG	1.50
F	CONCENTRATE CIP OUTLET	150# RF FLG	1.50
G	COMPRESSED AIR INLET	FNPT	0.375"

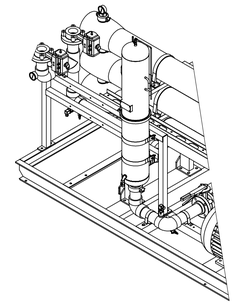


SS CARTRIDGE FILTER OPTION

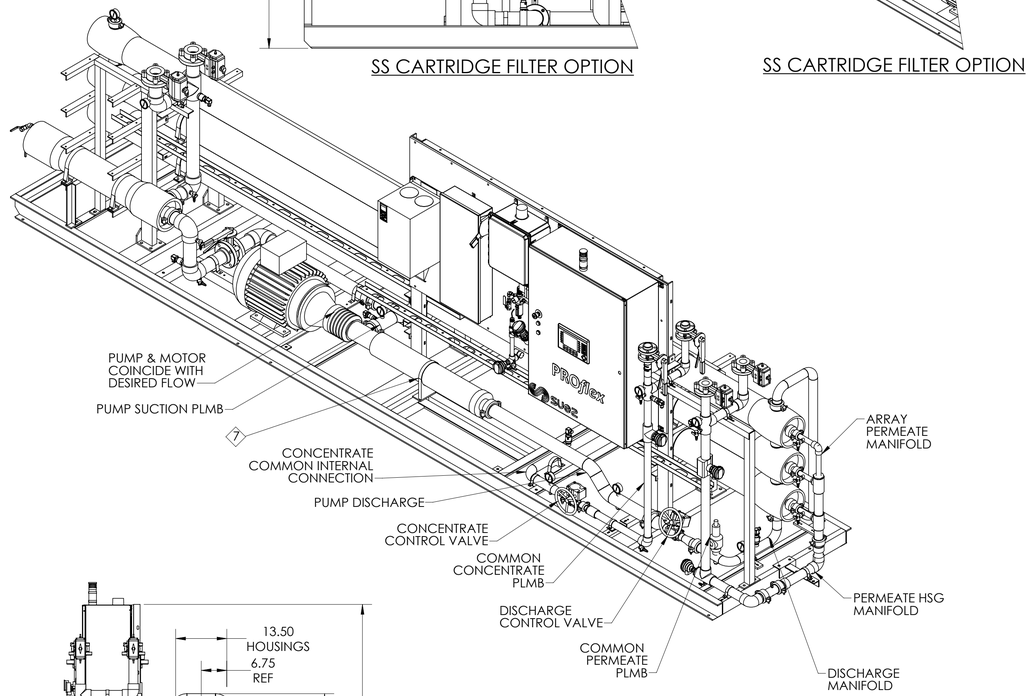


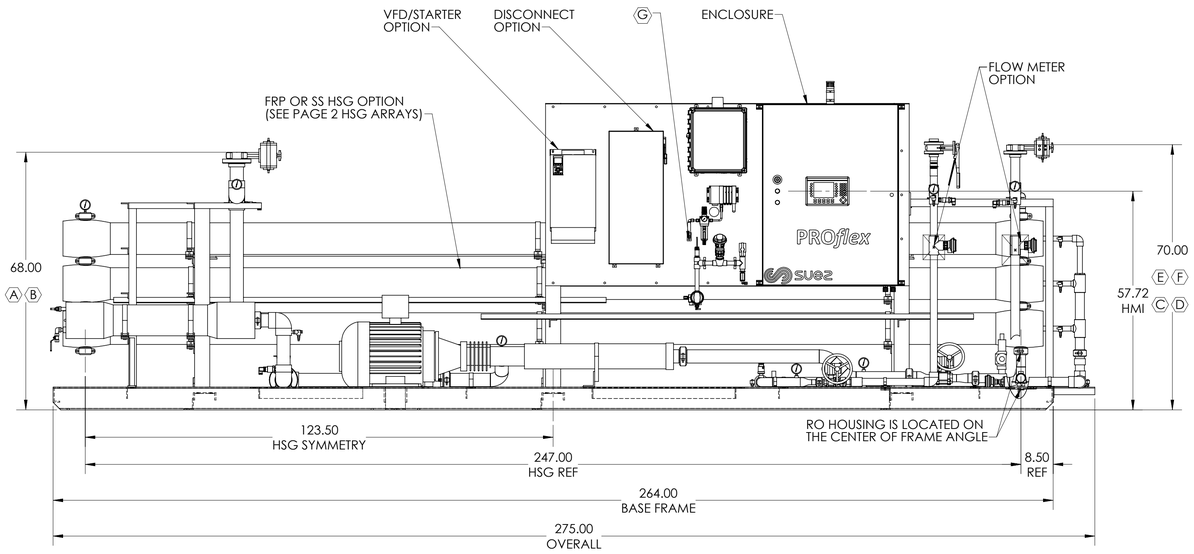


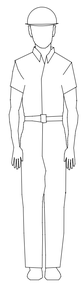
SS CARTRIDGE FILTER OPTION

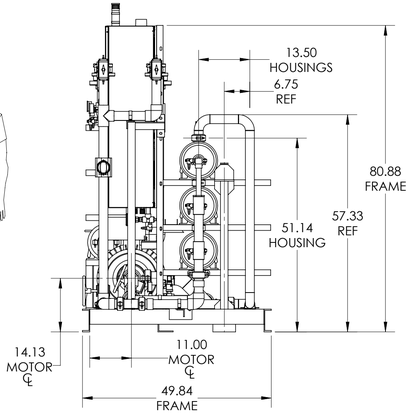


SS CARTRIDGE FILTER OPTION









NOTES:

	SHIPPING WEIGHT		OPERATING WEIGHT
	SKID WRAPPED / BOXED	ELEMENTS SHIPPED LOOSE	
SKID WITH ELEMENTS	5173 lb / 2348 kg		6658 lb / 3021 kg
SKID WITHOUT ELEMENTS	4538 lb / 2060 kg	678 lb / 308 kg	

1. ALL PIPING & EQUIPMENT SHOWN SHALL BE FULLY SUPPORTED BY SUEZ PRODUCTION.
2. ALL INTERCONNECTING PIPING SHALL BE FULLY & INDEPENDENTLY SUPPORTED BY OTHERS.
3. GASKET MATERIAL:
   DILUTION WATER: 1/8" THK EPDM
   CHEMICAL: 1/8" THK GYLON 3450
4. FASTENER MATERIAL:
   SA307 GRADE B HEAVY HEX BOLTS/SA563 GRADE A HEAVY HEX NUTS
5. ALL DIMENSIONS IN INCHES.
6. REFERENCE - PIPING & INSTRUMENTATION DIAGRAM: 2900000PA-AP-01,2900000PA-AP-02,2900000PA-AP-03, 2900000PA-AP-04.

7 MOUNT PUMP SUPPORT BRACKET 8"-10" FROM PUMP DISCHARGE.

REV	DESCRIPTION	ECO	DWN	APPR	APPR	DATE
E	WEIGHT DETAILS UPDATED	135692	VE	MR	CJ	24 Mar 20
D	CHANGED COMPRESSED AIR INLET SIZE	135472	TG	SR	CJ	28 Feb 20
C	ADDED NOTE NO.9	134887	AV	CJ	CJ	01 Nov 19
B	DESIGN UPDATE	133611	TG	SR	JM	04 Oct 19
A	INITIAL RELEASE	133312	SW	SR	JM	25 Apr 19

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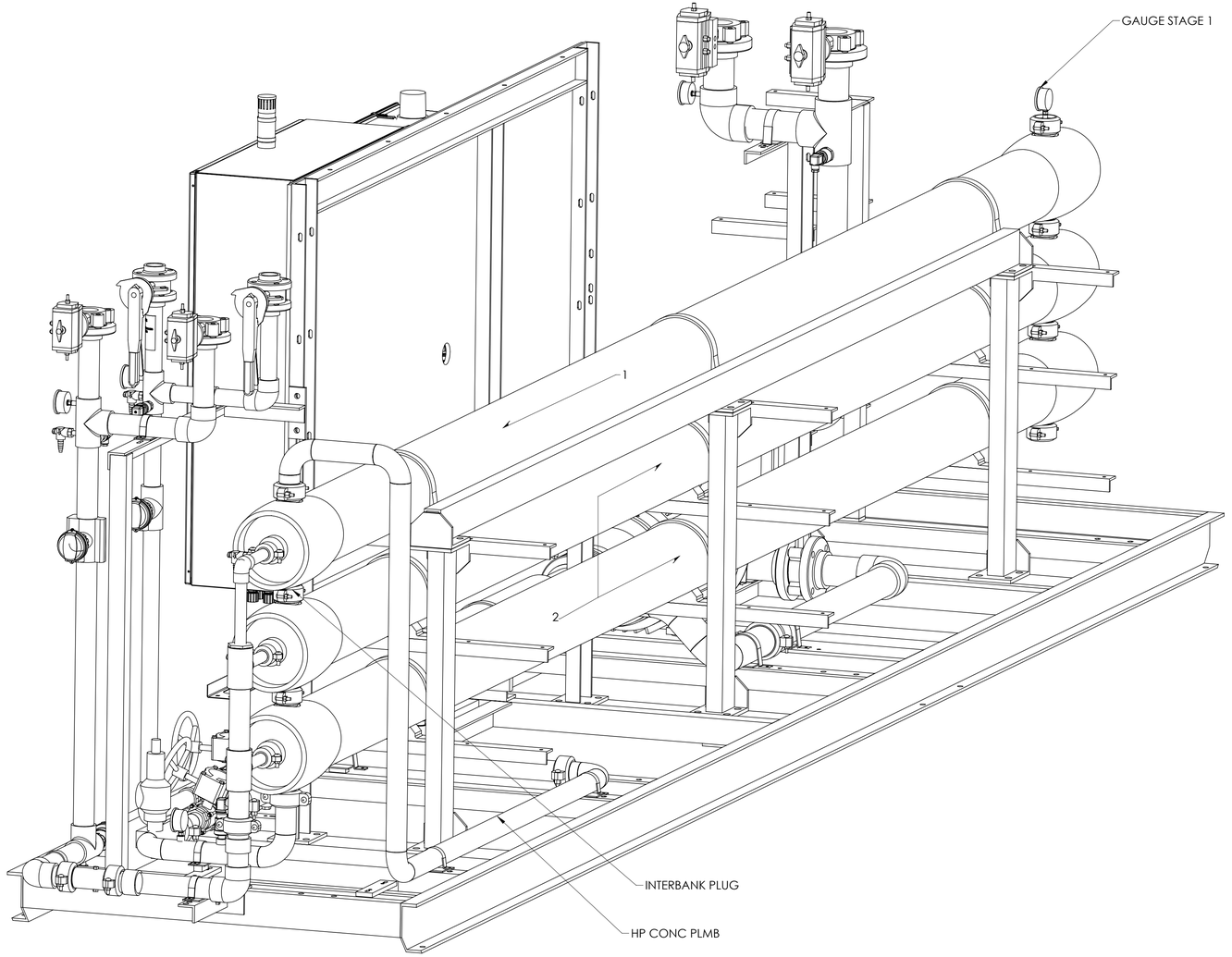
TOLERANCES UNLESS NOTED
DECIMALS ANGLES
.X +/-0.5°
.XX +/-0.50 FRAC
.XXX +/- 1/2"

CUSTOMER INFORMATION: ProFlex RO

GA,PROFLEX-RO,
18-2 FFPS,46,TF,AB

DRAWING NUMBER				REVISION
2900000PA-PG-01				E
REF.:	DOC. OWNER:			
PROJECT NO.	PART/MATERIAL NO.	SCALE	SIZE	SHEET
2900000	2900000PA	1:24	D	1 OF 3

LAST SAVED: Thursday, April 9, 2020 8:20:02 PM
FILE LOCATION: D:\SWP\DM\SYSTEMS-IFC\2900000 - ProFlex RO\2. Mechanical Drawings\



HSG ARRAY PA
18 MEMBRANE (2 STAGE)
BANKING 2-1
INTERBANK PLUG (1PL)

REV	DESCRIPTION	ECO	DWN	APPR	APPR	DATE
E	WEIGHT DETAILS UPDATED	135692	VE	MR	CJ	24 Mar 20
D	CHANGED COMPRESSED AIR INLET SIZE	135472	TG	SR	CJ	28 Feb 20
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B	DESIGN UPDATE	133611	TG	SR	JM	04 Oct 19
A	INITIAL RELEASE	133312	SW	SR	JM	25 Apr 19

TOLERANCES UNLESS NOTED
DECIMALS: .X, .XX +/-0.50, .XXX
ANGLES: +/-0.5°
FRAC: +/- 1/2"

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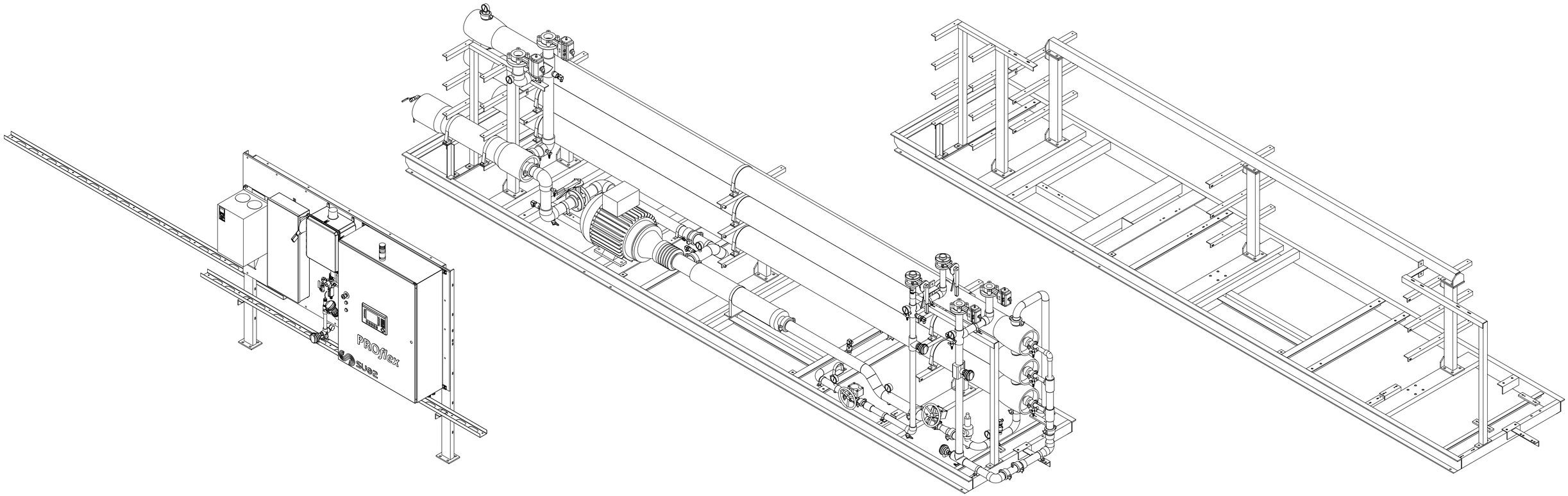
suez

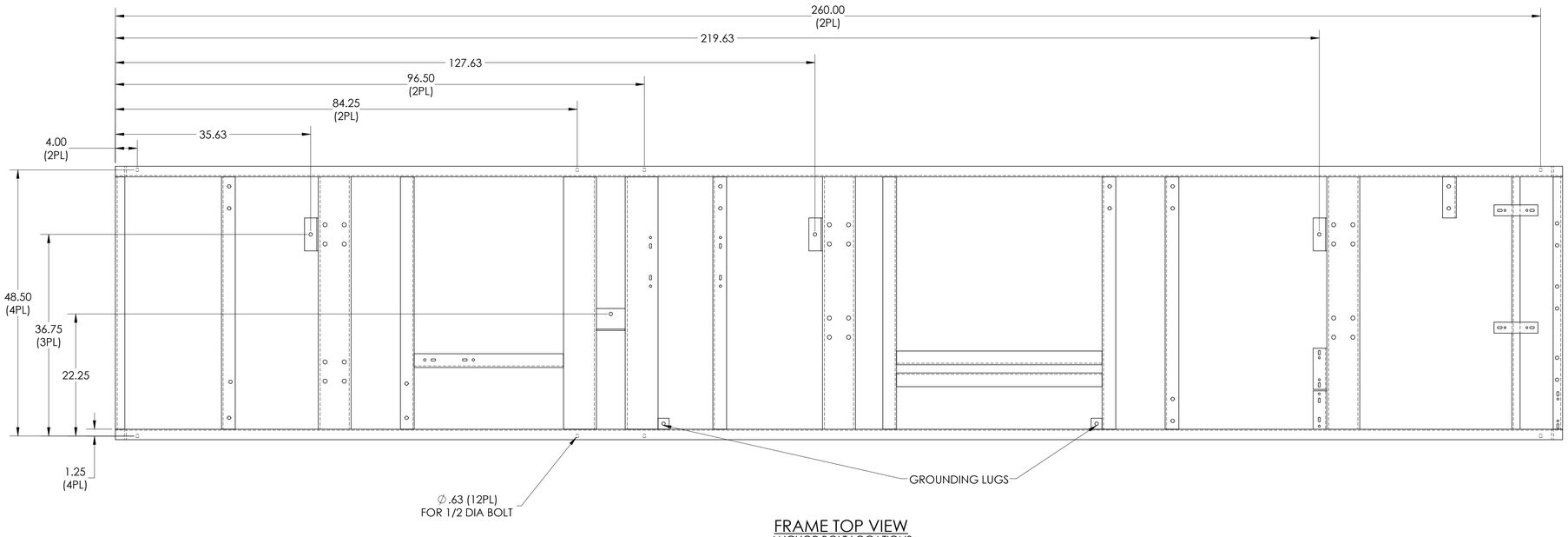
CUSTOMER INFORMATION: ProFlex RO

GA,PROFLEX-RO,
18-2 FFPS,46,TF,AB

DRAWING NUMBER: 2900000PA-PG-01
REVISION: E
REF.:
DOC. OWNER:
PROJECT NO.: 2900000
PART/MATERIAL NO.: 2900000PA
SCALE: 1:24
SIZE: D
SHEET: 2 OF 3

FILE LOCATION: D:\SWP\DMS\SYSTEMS-IFO\2900000 - Proflex RO\2. Mechanical Drawings\
LAST SAVED: Thursday, April 9, 2020 8:20:02 PM





FRAME TOP VIEW
ANCHOR BOLT LOCATIONS
SCALE = 1:20

REV	DESCRIPTION	ECO	DWN	APPR	APPR	DATE
E	WEIGHT DETAILS UPDATED	135692	VE	MR	CJ	24 Mar 20
D	CHANGED COMPRESSED AIR INLET SIZE	135472	TG	SR	CJ	28 Feb 20
C	ADDED NOTE NO.9	134887	AV	CJ	CJ	01 Nov 19
B	DESIGN UPDATE	133611	TG	SR	JM	04 Oct 19
A	INITIAL RELEASE	133312	SW	SR	JM	25 Apr 19

TOLERANCES UNLESS NOTED
DECIMALS: .X; .XX +/-0.50; .XXX
ANGLES: +/-0.5°
FRAC: +/- 1/2"

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CUSTOMER INFORMATION: ProFlex RO

GA,PROFLEX-RO,
18-2 FFPS,46,TF,AB

DRAWING NUMBER	REVISION
2900000PA-PG-01	E

REF.: | DOC. OWNER:

PROJECT NO.	PART/MATERIAL NO.	SCALE	SIZE	SHEET
2900000	2900000PA	1:24	D	3 OF 3

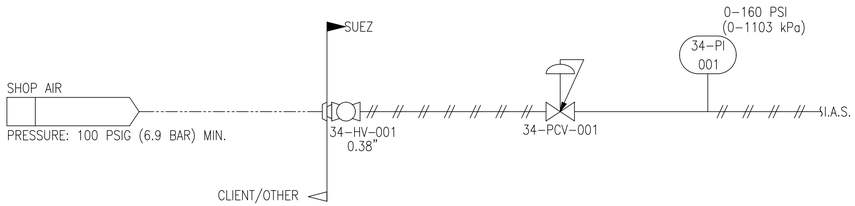
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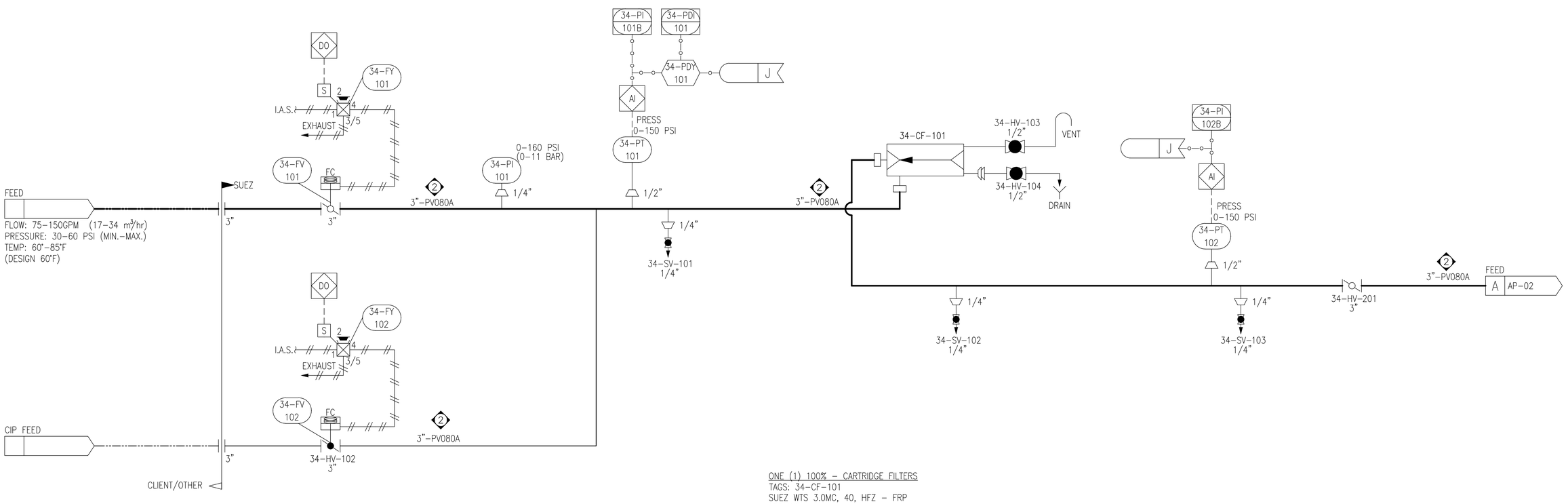
LAST SAVED: Thursday, April 9, 2020 8:20:02 PM

NOTE:

1. SOLENOID HAS INTERNAL FLOW CONTROL.

(2) OPTIONAL PIPING CLASS: SS150C





ONE (1) 100% - CARTRIDGE FILTERS
TAGS: 34-CF-101
SUEZ WTS 3.0MC, 40, HFZ - FRP
100 PSI
CARTRIDGES
40"-1 EA.-1 MICRON
HF.zS01-40-FSE

REV	DESCRIPTION	ECO	DWN	APPR	APPR	DATE
G	ADDED OPTIONAL PIPING SS150C AND REVISED INPUT AIR SUPPLY AS NOTED	135472	TG	SR	CJ	28 Feb 20
F	REMOVED PREMIUM NOTE	133611	TG	SR	JM	27 Aug 19
E	ADDED PT BEFORE AND AFTER CF	133312	JM	JM	JM	10 May 19
D	UPDATED FRP FILTERS SYMBOL	132603	TG	SR	JM	27 Nov 18
C	DESIGN UPDATE	131363	SW	SR	MS	16 Aug 18

TOLERANCES UNLESS NOTED
DECIMALS: .X ±, .XX ±, .XXX ±
ANGLES: ±
FRAC: ±

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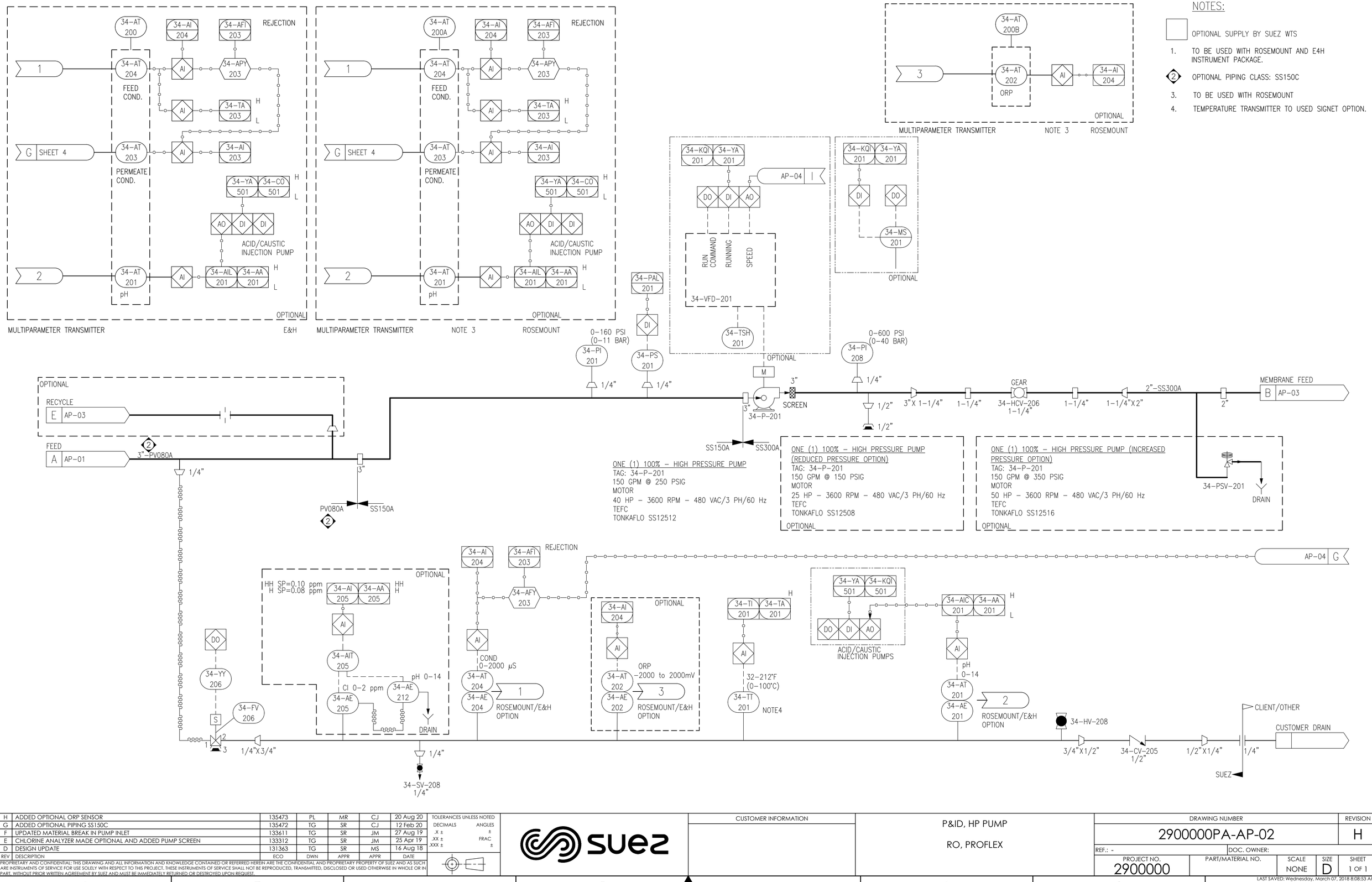
CUSTOMER INFORMATION

P&ID, INLET

RO, PROFLEX

DRAWING NUMBER: 2900000PA-AP-01
REVISION: G
REF.: -
DOC. OWNER:
PROJECT NO.: 2900000
PART/MATERIAL NO.:
SCALE: NONE
SIZE: D
SHEET: 1 OF 1
LAST SAVED: Wednesday, March 07, 2018 8:08:53 AM

FILE LOCATION: C:\Users\109524Z\Documents\GE TCS CONFIDENTIAL\Mar18\07mar\PROFLUX P&ID\SUEZ D-Size.dwg



REV	DESCRIPTION	ECO	DWN	APPR	APPR	DATE
H	ADDED OPTIONAL ORP SENSOR	135473	PL	MR	CJ	20 Aug 20
G	ADDED OPTIONAL PIPING SS150C	135472	TG	SR	CJ	12 Feb 20
F	UPDATED MATERIAL BREAK IN PUMP INLET	133611	TG	SR	JM	27 Aug 19
E	CHLORINE ANALYZER MADE OPTIONAL AND ADDED PUMP SCREEN	133312	TG	SR	JM	25 Apr 19
D	DESIGN UPDATE	131363	TG	SR	MS	16 Aug 18

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TOLERANCES UNLESS NOTED
DECIMALS: .X ± .XX ± .XXX ±
ANGLES ±
FRAC ±

CUSTOMER INFORMATION

P&ID, HP PUMP
RO, PROFLEX

DRAWING NUMBER: 2900000PA-AP-02
REVISION: H
REF.: -
DOC. OWNER:
PROJECT NO.: 2900000
PART/MATERIAL NO.:
SCALE: NONE
SIZE: D
SHEET: 1 OF 1
LAST SAVED: Wednesday, March 07, 2018 8:08:53 AM

FILE LOCATION: C:\Users\1095242\Documents\GE TCS CONFIDENTIAL\Mar18\07mar\PROFLUX P&ID\SUEZ D-Size.dwg

NOTE:

1 OPTIONAL PIPING CLASS: SS150C

34-PI 202B

34-PDI 201

34-PDY 201

H

AI

PRESS 0-500 PSI

34-PT 202

0-600 PSI (0-40 BAR)

34-PI 202

MEMBRANE FEED

B AP-02

1/4"

1/2"

1/2"

1/2"

2"-SS300A

0-600 PSI (0-40 BAR)

34-PI 203

1/4"

1

1"-PV080A (TYP)

1"

1/4"

1"X2"

34-SV-211

1/4"

1/4"

1"X2"

34-SV-212

1/4"

1/4"

1"X2"

34-SV-221

1/4"

RO SYSTEM
TAG: 34-RO-300
ARRAY: 2 STAGE 2:1
450 PSIG
MEMBRANES
8"X40" - 18 EA

STAGE-2
TAG: 34-RO-221

STAGE-1
TAG: 34-RO-211-212

PERMEATE

C AP-04

34-PI 205B

H

AI

PRESS 0-500 PSI

34-PT 205

1/2"

0-600 PSI (0-40 BAR)

34-PI 205

1/4"

2"X1"

CONCENTRATE

D AP-04

2"-SS300A

1/4"

1/4"

RECYCLE

E AP-02

OPTIONAL

REV	DESCRIPTION	ECO	DWN	APPR	APPR	DATE
F	ADDED OPTIONAL PIPING SS150C	135472	TG	SR	CJ	12 Feb 20
E	REMOVED PREMIUM NOTE	133611	TG	SR	JM	27 Aug 19
D	MOVED PLUG	132603	SW	SR	JM	27 Nov 18
C	DESIGN UPDATE	131363	TG	SR	MS	16 Aug 18
B	SUEZ TITLE BLOCK UPDATION	-	TG	SR	JM	10 Apr 18

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TOLERANCES UNLESS NOTED
DECIMALS ANGLES
.X ± ±
.XX ± FRAC
.XXX ± ±

CUSTOMER INFORMATION

P&ID, MEMBRANE,

RO, PROFLEX

DRAWING NUMBER: 2900000PA-AP-03

REVISION: F

REF.: -

DOC. OWNER:

PROJECT NO.: 2900000

PART/MATERIAL NO.:

SCALE: NONE

SIZE: D

SHEET: 1 OF 1

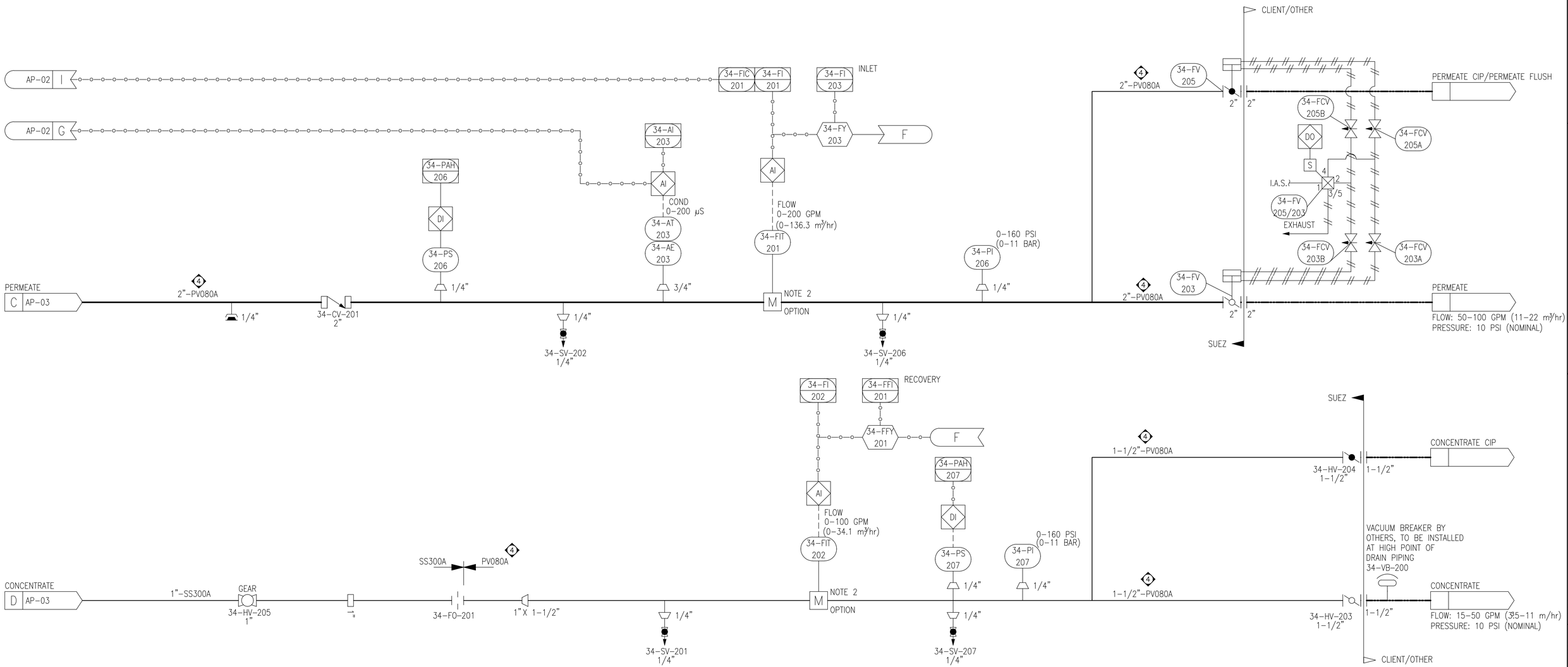
LAST SAVED: Wednesday, March 07, 2018 8:08:53 AM

FILE LOCATION: C:\Users\1095242\Documents\GE TCS CONFIDENTIAL\Mar18\07mar\PROFLUX P&ID\SUEZ D-Size.dwg

NOTE: SOLENOID FOR VALVE

1. 34-FV-205 & 34-FV-203 ARE TUBED FOR PARALLEL OPERATION.
2. ROSEMOUNT OR E4H MAGMETER.
3. SEE SOLENOID TUBING DIAGRAM 1317741 PPL/TUBING AND 1317742 SS TUBING.

④ OPTIONAL PIPING CLASS: SS150C



REV	DESCRIPTION	ECO	DWN	APPR	APPR	DATE
G	ADDED OPTIONAL PIPING SS150C	135472	TG	SR	CJ	12 Feb 20
F	UPDATED SOLENOID VALVE CONTROL NUMBERS AND ADDED PLUG FOR DRAIN	133312	TG	SR	JM	25 Apr 19
E	RO PERMEATE SOLENOID VALVE UPDATED	132853	AL	MR	JM	08 Jan 19
D	DESIGN UPDATE	131363	TG	SR	MS	16 Aug 18
C	SUEZ TITLE BLOCK UPDATION	-	TG	SR	JM	10 Apr 18

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TOLERANCES UNLESS NOTED
DECIMALS: .X ± .XX ± .XXX ±
ANGLES ±
FRAC ±

CUSTOMER INFORMATION

P&ID, OUTLET

RO, PROFLEX

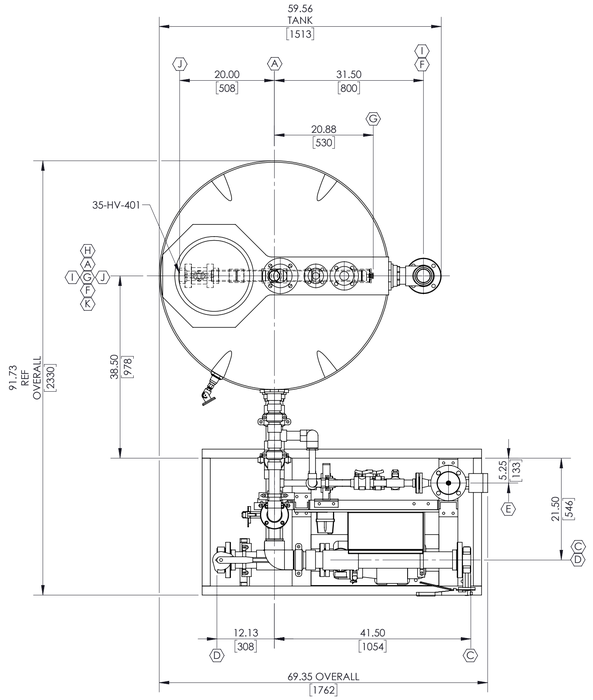
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2900000PA-AP-04	G

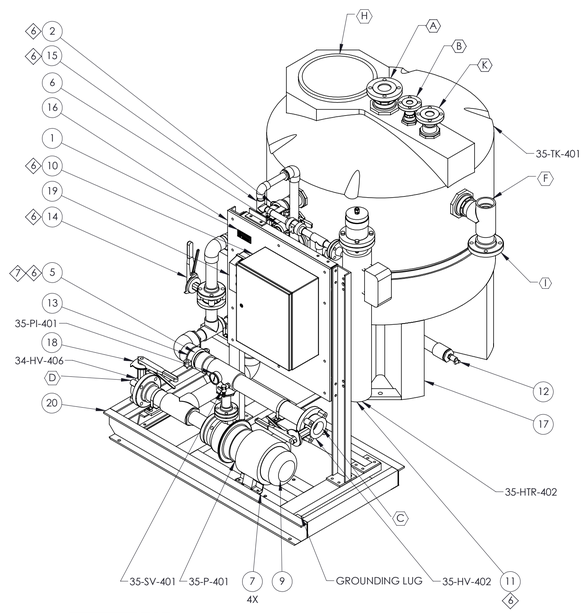
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PROJECT NO.	PART/MATERIAL NO.	SCALE	SIZE	SHEET
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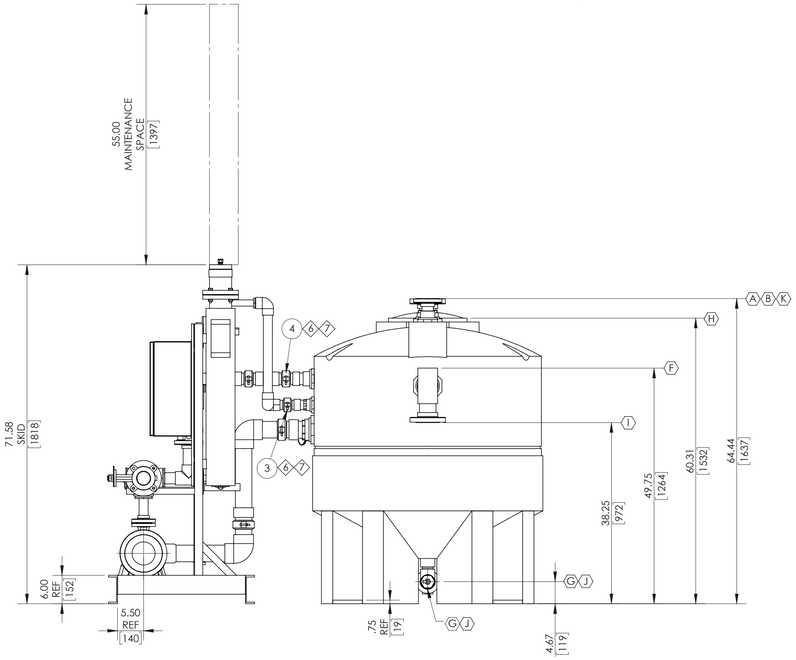
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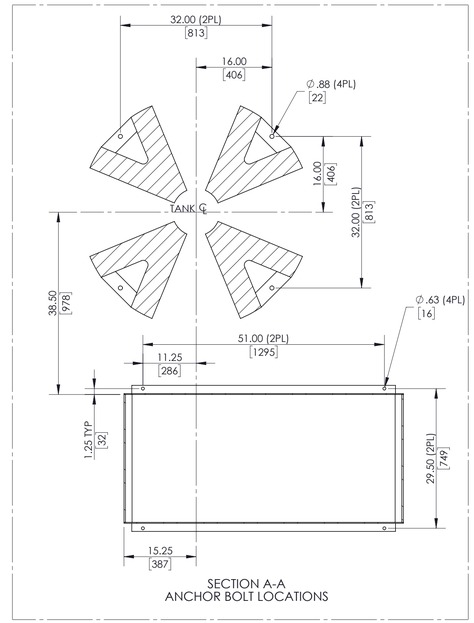


CONNECTION TABLE				
ITEM	DESCRIPTION	MATERIAL	TYPE	SIZE
A	CIP PERMEATE RETURN	PVC	150# FLANGE	3.00
B	CIP CONCENTRATE RETURN	PVC	150# FLANGE	1.50
C	RO CIP FEED	PVC	150# FLANGE	3.00
D	DRAIN SYSTEM	PVC	150# FLANGE	3.00
E	CIP CHEMICAL	PVC	THREAD(F)	0.50
F	VENT	PVC	SOC	3.00
G	LEVEL TRANSMITTER	PVC	THREAD	0.25
H	MANWAY	HDPE	PINT GLASS	16.00
I	TANK OVERFLOW	PVC	150# FLANGE	3.00
J	TANK DRAIN	PVC	SOC	2.00
K	SERVICE WATER	PVC	150# FLANGE	2.00

NOTES:

1. SHIPPING WEIGHT - 1,180 lb/[540 kg]
2. OPERATING WEIGHT - 5,640 lb/[2,560 kg]
3. ALL DIMENSIONS IN INCHES.
4. REFERENCE - PIPING & INSTRUMENTATION DIAGRAM: 1318217
5. LEAVE 0.125 GAP BETWEEN ADAPTORS OF ALL VICTAULIC COUPLINGS.
6. FOR OPTIONAL EQUIPMENTS ONLY.
7. CLOSE WITH PLUG IF CHEMICAL INJECTION AND HEATER IS NOT REQUIRED.

EQUIPMENT & PLUMBING TABLE				
ITEM	QTY.	SAP	DESCRIPTION	U/M
1	1	1119181	LABEL-MOD,S/N,SUEZ WATER,4.0X1.7	EA
6 2	1	1144850	COUPLING-MC,GLV,2.00,EPDM,LP,75	EA
6 3	1	1156020	PLUG,M.CPLG,PVC,1.50	EA
6 4	1	1156209	PLUG,M.CPLG,PVC,2.00	EA
6 5	1	1156211	PLUG,M.CPLG,PVC,3.00	EA
6	1	1163601	COUPLING-MC,GLV,1.50,EPDM,LP,75	EA
7	4	1235496	SHIM,PLASTIC,1.88X2.63X0.125,0.625,SLOT	EA
8	1	1261208	GAUGE-TEMP,316,3.0,F,-20/120,0.75MPT,4.5	EA
9	1	1269426	PUMP-CENT,316,7.5HP,230/460/60/3PH,GL	EA
6 10	1	3034554	ENCL-CIP HEATER CTRL,N4,24KW,CHROMOLOX	EA
6 11	1	3035390	HEATER-CIRC,480/60/3,12KW	EA
12	1	3054130	TRANS-PRESS,0-138"4-20MA,BLND,GE,PTX5072	EA
13	1	3167074	PLMB-DISCH,PVC,3.00X1.50,CIP-SYS-18-24	EA
6 14	1	3167075	PLMB,CHEM-INJ,3.00X2.00,CIP-SYS-18-24	EA
6 15	1	3167076	PLMB,HEATER OUT,1.50X1.00,CIP-SYS-18-24	EA
16	1	3167117	PANEL,SHEET,HDPE,96.00X48.00X0.50	EA
17	1	3167360	TANK-CIP,HDPE W/PE,300 GAL,3.0/1.5/3.0	EA
18	1	3167640	PLMB-INLET,PVC,3.00X2.50,CIP-SYS-18-24	EA
19	1	3169311	STARTER,N4X,600/110-120VAC,S&S,3.2-12A	EA
20	1	3169413	ASSY-FRAME,CS,CIP,12-24,PAINTED	EA



SECTION A-A
ANCHOR BOLT LOCATIONS

REV	DESCRIPTION	ECO	DWN	APPR	APPR	DATE
D	BOM TABLE UPDATED	135003	MR	SKS	CJ	04 Dec 19
C	DESIGN UPDATE	134446	TG	SR	JM	19 Aug 19
B	FRAME ASSEMBLY CREATED SEPERATELY	134021	TG	SR	JM	04 Jul 19
A	INITIAL RELEASE	132737	SW	SR	JM	18 Jan 19

TOLERANCES UNLESS NOTED
DECIMALS .X 0.50 .XX .XXX
ANGLES 0.5° FRAC NA

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CUSTOMER INFORMATION

SYS-CIP,
18-24,460VAC,60HZ

DRAWING NUMBER				REVISION
1318224				D
REF.:	DOC. OWNER:			
PROJECT NO.	PART/MATERIAL NO.	SCALE	SIZE	SHEET
	3167060	1:16	D	1 OF 1

LAST SAVED: Wednesday, December 11, 2019 5:43:21 PM

FILE LOCATION: D:\CGE\Water\Vault\SYSTEMS-PO\PO\1310000\

CONTROL VALVE ACTUATORS

- PISTON ACTING
- PISTON SPRING TO OPEN
- PISTON SPRING TO CLOSE
- DIAPHRAGM ACTING
- DIAPHRAGM SPRING TO OPEN
- DIAPHRAGM SPRING TO CLOSE
- DIAPHRAGM DOUBLE BALANCING
- BACK PRESSURE CONTROL (EXTERNAL REGULATING)
- BACK PRESSURE CONTROL (INTERNAL REGULATING)
- PRESSURE REDUCING (EXTERNAL REGULATING)
- PRESSURE REDUCING (INTERNAL REGULATING)
- ROTARY MOTOR ANALOG
- ROTARY MOTOR DIGITAL
- INTEGRAL I/P CONVERTER
- POSITIONER
- TRAVEL STOP
- GEAR MANUAL GEAR WHEEL
- CHAIN MANUAL CHAIN WHEEL
- SOLENOID
- SOLENOID 3 WAY
- SOLENOID 4 WAY

VALVE SYMBOLS

(VALVES NORMALLY OPEN EXCEPT WHEN SHADED)

- GATE (OR GENERIC)
- BALL
- BUTTERFLY
- NEEDLE
- GLOBE
- DIAPHRAGM
- PLUG
- PINCH
- V-BALL
- KNIFE GATE
- SLIDING GATE
- BACKFLOW PREVENTER
- CHECK
- INJECTION QUILL
- VACUUM BREAKER
- FOOT
- FLOAT
- MUD
- 3 WAY
- 4 WAY
- 5 WAY
- 6 WAY
- 3 VALVE MANIFOLD
- 5 VALVE MANIFOLD
- SAMPLE

RELIEF

- PRESSURE SAFETY
- VACUUM SAFETY
- PRESSURE RUPTURE DISK
- VACUUM RUPTURE DISK
- GAGE GUARD
- AIR SAFETY
- PULSATION DAMPNER
- VENT VENT
- GROUND
- DRAIN DRAIN

PUMPS & COMPRESSORS

- CENTRIFUGAL
- METERING/ CHEMICAL
- DIAPHRAGM
- POSITIVE DISPLACEMENT
- VERTICAL TURBINE
- SUBMERSIBLE/ CAN
- WELL
- DRUM
- SUMP
- ERI PRESSURE EXCHANGER (HP, LP)
- HYDRAULIC PRESSURE BOOSTER (HP, LP)
- MOTOR
- CENTRIFUGAL BLOWER
- ROTARY COMPRESSOR LOBE/BLOWER
- VACUUM LIQUID RING
- AIR COMPRESSOR PISTON
- AIR COMPRESSOR ROTARY SCREW
- AIR DRYER
- FAN

FLOW ELEMENT

- PADDLE WHEEL
- ANNUBAR
- FLOW NOZZLE
- FLUME
- MAGNETIC
- PITOT
- SONIC/ ULTRASONIC
- TURBINE
- VENTURI TUBE
- VORTEX
- MASS FLOW/ CORIOLIS
- ROTAMETER
- IN-LINE FLOW GLASS (FG)
- FLOW STRAIGHTENER
- FIXED ORIFICE
- ADJUSTABLE ORIFICE
- RESTRICTED ORIFICE
- RESTRICTED ORIFICE ANGLE
- ORIFICE PLATE QUICK-CHANGE

CONNECTIONS

- FLANGE
- FLANGE BLIND
- VICTAULIC
- VICTAULIC PLUG
- SANITARY
- SANITARY PLUG
- THREADED
- THREADED PLUG
- SOCKET
- UNION
- CAMLOCK
- CAMLOCK PLUG
- HOSE BARB
- WELDED PIPE CAP
- STRAUB
- REDUCER
- SPECTACLE BLIND CLOSED

HEATING

- TANK HEATER
- HEAT EXCHANGER
- PLATE & FRAME HEAT EXCHANGER
- DESUPERHEATER

FILTERS

- FIXED SCREEN
- WEDGE WIRE STRAINER
- BAR SCREEN
- HEPA FILTER
- Y STRAINER
- CONE STRAINER
- FILTER (F)
- PUMP SCREEN
- STEAM TRAP (ST)
- RESIN TRAP

RO/UF

- FOUR PORT HOUSING
- TWO PORT HOUSING
- END PORT HOUSING
- MEMBRANE MODULE

VESSELS/TRIM

- CONICAL BOTTOM TANK
- TANK (CLOSED TOP)
- TANK (OPEN TOP)
- DOMED TANK
- PRESSURE VESSEL HORIZONTAL/ VERTICAL
- PROPELLER AGITATOR (M)
- VORTEX BREAKER (VB)
- VESSEL INSULATION
- LEVEL GLASS
- TANK EDUCTOR
- ELLIPTICAL MANWAY
- MANHOLE
- MANHOLE W/ DAVIT ARM
- VESSEL SIGHT GLASS
- WATER LEVEL
- LADDER/ PLATFORM

MISCELLANEOUS

- MUFFLER
- EDUCTOR
- STATIC MIXER
- EXPANSION JOINT
- SILENCER
- VIBRATION ISOLATOR
- HIGH PRESSURE FLEXIBLE CONNECTOR
- INJECTION SPARGER
- SPRAYER NOZZLE
- DESICCANT DRYER
- HYDROMETER POT
- COARSE BUBBLE DIFFUSER ELEVATION VIEW
- THERMOWELL
- TOP MOUNT LEVEL SWITCH
- ULTRASONIC LEVEL
- CALIBRATION COLUMN
- PIG TAIL (XXX / XXX)
- ION EXCHANGE BOTTLE

SCOPE BREAK

- CLIENT/OTHER
- SUEZ

MATERIAL BREAK

MATERIAL A — MATERIAL B

PIPE INSULATION/ DOUBLE CONTAINMENT

PP 2"

("PP" INDICATES PERSONNEL PROTECTION –OPTIONAL)

LINE TYPES

- PRIMARY PROCESS
- SECONDARY PROCESS
- SAMPLE/DRAINS/ VENTS/ETC
- PRIMARY PROCESS (BY OTHERS)
- SECONDARY PROCESS (BY OTHERS)
- FUTURE
- EQUIPMENT LIMIT OR BOUNDARY LINE
- EQUIPMENT
- EQUIPMENT (BY OTHERS)
- FLEX HOSE/TUBING
- SOFTWARE-LINK
- ELECTRICAL
- PNEUMATIC
- HYDRAULIC SIGNAL
- CAPILLARY TUBING
- HEAT-TRACING
- STEAM-TRACE
- ELECTRICAL-TRACE

MISCELLANEOUS LINE OBJECTS

- SLOPE
- CONTINUATION SYMBOL
- CONTINUATION SYMBOL
- CROSSOVER LINE
- REVISION CLOUD
- REVISION TRIANGLE (A)

REV	DESCRIPTION	ECO	DWN	APPR	APPR	DATE
C	PUMP MODEL NO. UPDATED	135003	MR	SKS	CJ	04 Dec 19
B	UPDATED TANK DRAIN VALVES TAG	134446	TG	SR	JM	19 Aug 19
A	INITIAL RELEASE	132737	SW	SR	JM	16 Jan 19

TOLERANCES UNLESS NOTED
DECIMALS .X .XX .XXX
ANGLES
FRAC

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CUSTOMER INFORMATION

PROFLEX-RO,SYSTEM P&ID,

100GPM

CIP-18-24

DRAWING NUMBER	REVISION
1318217	C

REF.: -

DOC. OWNER:

PROJECT NO.	PART/MATERIAL NO.	SCALE	SIZE	SHEET
	3167060		D	1 OF 3

LAST SAVED: Wednesday, December 11, 2019 5:01:11 PM

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INSTRUMENT FUNCTIONS

FIRST LETTER / MEASURED OR INITIATING VARIABLE	A ALARM	A HIGH- HIGH ALARM	A HIGH ALARM	A LOW ALARM	A LOW-LOW ALARM	A SENSOR FAULT ALARM	C BLIND CONTROLLER	C INDICATING CONTROLLER	E SENSOR (PRIMARY ELEMENT)	G GLASS	I INDICATOR	L PILOT LIGHT	Q TOTALIZER	R RECORD	S SWITCH	S HIGH-HIGH SWITCH	S HIGH SWITCH	S LOW SWITCH	S LOW-LOW SWITCH	T BLIND TRANSMITTER	T INDICATING TRANSMITTER	Y SOLENOID VALVE (PILOT), RELAY, COMPUTATION, CONVERTER	V,Z CONTROL VALVE	V,Z VALVE	V,Z FINAL CONTROL ELEMENT	SPECIAL IDENTIFICATION SYMBOL	SPECIAL IDENTIFICATION DESCRIPTION
A ANALYSIS	AA	AAHH	AAH	AAL	AALL	AAT	AC	AIC	AE		AI	AL		AR	AS	ASHH	ASH	ASL	ASLL	AT	AIT	AY	ACV	AV	AZ		
B BURNER, COMBUSTION																											
C USER'S CHOICE																											
D USER'S CHOICE																											
E VOLTAGE	EA	EAHH	EAH	EAL	EALL	EAT	EC	EIC	EE		EI	EL		ER	ES	ESHH	ESH	ESL	ESLL	ET	EIT	EY			EZ		
F FLOW	FA	FAHH	FAH	FAL	FALL	FAT	FC	FIC	FE	FG	FI	FL	FQI	FR	FS	FSHH	FSH	FSL	FSLL	FT	FIT	FY	FCV	FV		FO	ORIFICE PLATE
FF FLOW RATIO	FFA	FFAHH	FFAH	FFAL	FFALL		FFC	FFIC			FFI			FFR	FFS	FFSHH	FFSH	FFSL	FFSLL			FFY	FFCV				
G USER'S CHOICE																											
H HAND	HA						HC	HIC				HL			HS								HCV	HV		HMS	PUSHBUTTON SWITCH
I CURRENT (ELECTRICAL)	IA	IAHH	IAH	IAL	IALL	IAT	IC	IIC	IE		II	IL		IR	IS	ISHH	ISH	ISL	ISLL	IT	IIT	IY			IZ		
J POWER	JA	JSHH	JAH	JAL	JALL	JAT	JC	JIC	JE		JI	JL	JQI	JR	JS	JSHH	JSH	JSL	JSLL	JT	LIT	JY			JZ		
K TIME SCHEDULE	KA										KI	KL			KS							KY					
KQ TIME TOTAL	KQA	KQAHH	KQAH	KQAL	KQALL						KQI	KQL		KQR	KQS	KQSHH	KQSH	KQSL	KQSLL								
L LEVEL	LA	LAHH	LAH	LAL	LALL	LAT	LC	LIC	LE	LG	LI	LL		LR	LS	LSHH	LSH	LSL	LSLL	LT	LIT	LY	LCV	LV			
M MOTOR CONTROL															MS												
N USER'S CHOICE																											
O USER'S CHOICE																											
P PRESSURE OR VACUUM	PA	PAHH	PAH	PAL	PALL	PAT	PC	PIC			PI	PL		PR	PS	PSHH	PSH	PSL	PSLL	PT	PIT	PIT	PY	PV		PSV	PRESSURE SAFETY VALVE
PD PRESSURE DIFFERENTIAL	PDA	PDAHH	PDAH	PDAL	PDALL	PDAT	PDC	PDIC			PDI	PDL		PDR	PDS	PDSHH	PDSH	PDSL	PDSLL	PDT	PDIT	PDY	PDCV				
Q QUANTITY													QQI														
R RADIATION																											
S SPEED OR FREQUENCY	SA	SAHH	SAH	SAL	SALL	SAT	SC	SIC	SE		SI	SL		SR	SS	SSHH	SSH	SSL	SSLL	ST	SIT	SY	SCV		SZ	SK	SPEED CONTROL STATION
T TEMPERATURE	TA	TAHH	TAH	TAL	TALL	TAT	TC	TIC	TE		TI	TL		TR	TS	TSHH	TSH	TSL	TSLL	TT	TIT	TY	TCV	TV	TZ	TW	THERMOWELL
U MULTI-VARIABLE																											
V VIBRATION OR MECH. ANALYSIS	VA	VAHH	VAH			VAT			VE		VI	VL		VR	VS	VSHH	VSH			VT	VIT	VY					
W WEIGHT OR FORCE	WA	WAHH	WAH	WAL	WALL	WAT	WC	WIC	WE		WI	WL	WQI	WR	WS	WSHH	WSH	WSL	WSLL	WT	WIT	WY	WCV	WV	WZ		
X UNCLASSIFIED																											
Y EVENT, STATE OR PRESENCE	YA										YI	YL		YR	YS												
Z POSITION OR DIMENSION	ZA	ZAO=OPEN		ZAC=CLOSE		ZAT	ZC	ZIC	ZE	ZG	ZI	ZL		ZR	ZS	ZSO=OPEN		ZSC=CLOSE		ZT	ZIT	ZY	ZCV	ZV	ZZ		

INSTRUMENT SYMBOLS

- PANEL MOUNT INSTRUMENT
- FIELD MOUNT INSTRUMENT
- BEHIND PANEL INSTRUMENT
- PILOT LIGHT
- PLC FUNCTION WITH DISPLAY
- PLC FUNCTION, BLIND
- PLC INPUT/OUTPUT

DI _ DISCRETE INPUT
DO _ DISCRETE OUTPUT
AI _ ANALOG INPUT
AO _ ANALOG OUTPUT

FUNCTIONS

- UNDEFINED INTERLOCK LOGIC
- SUMMING

CONTINUATION ARROWS

SERVICE
X | SHEET X
FLOW:
PRESSURE:
TEMP:
FLOW-SINGLE DIRECTION

SERVICE
X | SHEET X
FLOW:
PRESSURE:
TEMP:
FLOW-BOTH DIRECTIONS

X
TRANSFER ARROW TO SAME SHEET

EQUIPMENT / INSTRUMENT TAGGING SCHEME

11-XXX-222A-3
- IDENTICAL SKID/TRAIN IDENTIFIER (IF NECESSARY)
- MULTIPLE INSTRUMENT IDENTIFIER (IF NECESSARY)
- EQUIPMENT NUMBER/ INSTRUMENT LOOP NUMBER
- EQUIPMENT ABBREVIATION/ INSTRUMENT FUNCTION
- PROCESS AREA

LINE IDENTIFIER

X"-XXPPPA
- LINE CLASS SPECIFICATION
- SERVICE DIFFERNTIATOR (OPTIONAL)
- PR CODE (OPTIONAL)
- MATERIAL CODE
- PIPE SIZE

MATERIAL CODE	MATERIAL
	METALLIC
CC	CONCRETE
AUST	AUSTENITIC STAINLESS STEEL
AY	ALLOY 20
CI	CAST IRON
CS	CARBON STEEL
CU	COPPER
DI	DUCTILE IRON
DL	PVDF LINED
DUPL	DUPLEX STAINLESS STEEL
HC	HASTELLOY C
PL	POLYPROPYLENE LINED
SA	304, 304L STAINLESS STEEL
SB	AL-6XN
SC	254-SMO
SD	2205
SE	2507
SF	904L
SG	ZERON 100
SS	316, 316L STAINLESS STEEL
SUAU	SUPER AUSTENITIC STAINLESS STEEL
TL	PTFE LINED
	PLASTIC
CP	CPVC
FR	FIBER REINFORCED PLASTIC
PE	POLYETHYLENE
PP	POLYPROPYLENE
PV	PVC
PD	PVDF
PT	PTFE

PR CODE	CLASS
	METALLIC
125	ANSI CLASS 125
150	ANSI CLASS 150
300	ANSI CLASS 300
400	ANSI CLASS 400
600	ANSI CLASS 600
900	ANSI CLASS 900
	PLASTIC
040	SCHEDULE 40
080	SCHEDULE 80
120	SCHEDULE 120
D64	SDR 64
D41	SDR 41
D32	SDR 32.5
D26	SDR 26
D21	SDR 21
D17	SDR 17
D13	SDR 13.5
	MULTIPLE
P06	PN6
P10	PN10
P16	PN16
P20	PN20
P50	PN50
P68	PN68
P100	PN100
A00	ATMOSPHERIC
V00	VACUUM

EQUIPMENT ABBREVIATIONS

AB	ABSORBER
AC	AIR COMPRESSOR
ACF	ACTIVATED CARBON FILTER
AER	AERATOR
ARV	AIR RELEASE VALVE
B	BLOWER
BF	BAG FILTER
C	CENTRIFUGE, CYCLONE
CD	CONDENSER
CDM	CATALYTIC DESTRUCT MODULE
CF	CARTRIDGE FILTER
CH	CHILLER
CHL	CHLORINATOR
CIP	CLEAN-IN-PLACE
CL	CLARIFIER
CONV	CONVEYOR
CORS	CATALYTIC OXYGEN REMOVAL SYSTEM
CP	CONTROL PANEL
CR	CRYSTALIZER
CS	CHEMICAL SYSTEM
CT	COOLING TOWER, CARBON TOWER
CV	CHECK VALVE
DAF	DISSOLVED AIR FLOATATION
DMF	DUAL MEDIA FILTER
DR	AIR DRIER
E	EDUCTOR
EAF	ENTRAPPED AIR FLOATATION
ED	ELECTRODIALYSIS
EDI	ELECTRODEIONIZATION
EDR	ELECTRODIALYSIS REVERSAL
EV	EVAPORATOR
F	FILTER
FAN	FAN
F.C.	FAIL CLOSE
FDA	FORCED DRAFT AERATOR, DEGASIFIER
F.O.	FAIL OPEN
F.L.	FAIL LAST
FP	FILTER PRESS
GF	GRAVITY FILTER
H	HEATER
HF	HEPA FILTER
HMI	HUMAN-MACHINE INTERFACE
H-O-A	HAND-OFF-AUTO
HPB	HYDRAULIC PRESSURE BOOSTER
HX	HEAT EXCHANGER
IAS	INSTRUMENT AIR SUPPLY
IQ	INJECTION QUILL, INJECTION CHECK VALVE
IX	ION EXCHANGER
LS	LIME SOFTENER
M	MOTOR
MBR	MEMBRANE BIOREACTOR
MCC	MOTOR CONTROL CENTER
MD	MEMBRANE DEGASIFIER
MF	MICROFILTRATION
ML	MUFFLER, SILENCER
MMF	MULTIMEDIA FILTER
MX	MIXER
NF	NANOFILTRATION
OC	OXYGEN CONCENTRATOR
OZ	OZONATOR
OZG	OZONE GENERATOR
P	PUMP
PD	PULSATION DAMPENER
PLC	PROGRAMMABLE LOGIC CONTROLLER
PSE	RUPTURE DISC
PUV	MULTIFUNCTION VALVE
PX	PRESSURE EXCHANGER
RO	REVERSE OSMOSIS
RP	ROTARY PRESS
RT	RESIN TRAP
SC	SCRUBBER
SCP	SCRAPER
SCR	SCREEN
SFT	SOFTENER
SKM	SKIMMER
SM	STATIC MIXER, INLINE MIXER
ST	STEAM TRAP
STK	MEMBRANE STACK (ED, EDR, EDI, E-CELL)
STR	STRAINER
SV	SAMPLE VALVE
TK	TANK
TRB	TURBINE
UF	ULTRAFILTRATION
UPS	UNINTERRUPTIBLE POWER SUPPLY
UV	ULTRAVIOLET IRRADIATOR
VB	VACUUM BREAKER
VD	VACUUM DEGASIFIER

REV	DESCRIPTION	ECO	DWN	APPR	APPR	DATE
C	PUMP MODEL NO. UPDATED	135003	MR	SKS	CJ	04 Dec 19
B	UPDATED TANK DRAIN VALVES TAG	134446	TG	SR	JM	19 Aug 19
A	INITIAL RELEASE	132737	SW	SR	JM	16 Jan 19

TOLERANCES UNLESS NOTED
DECIMALS .X .XX .XXX
ANGLES
FRAC

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CUSTOMER INFORMATION

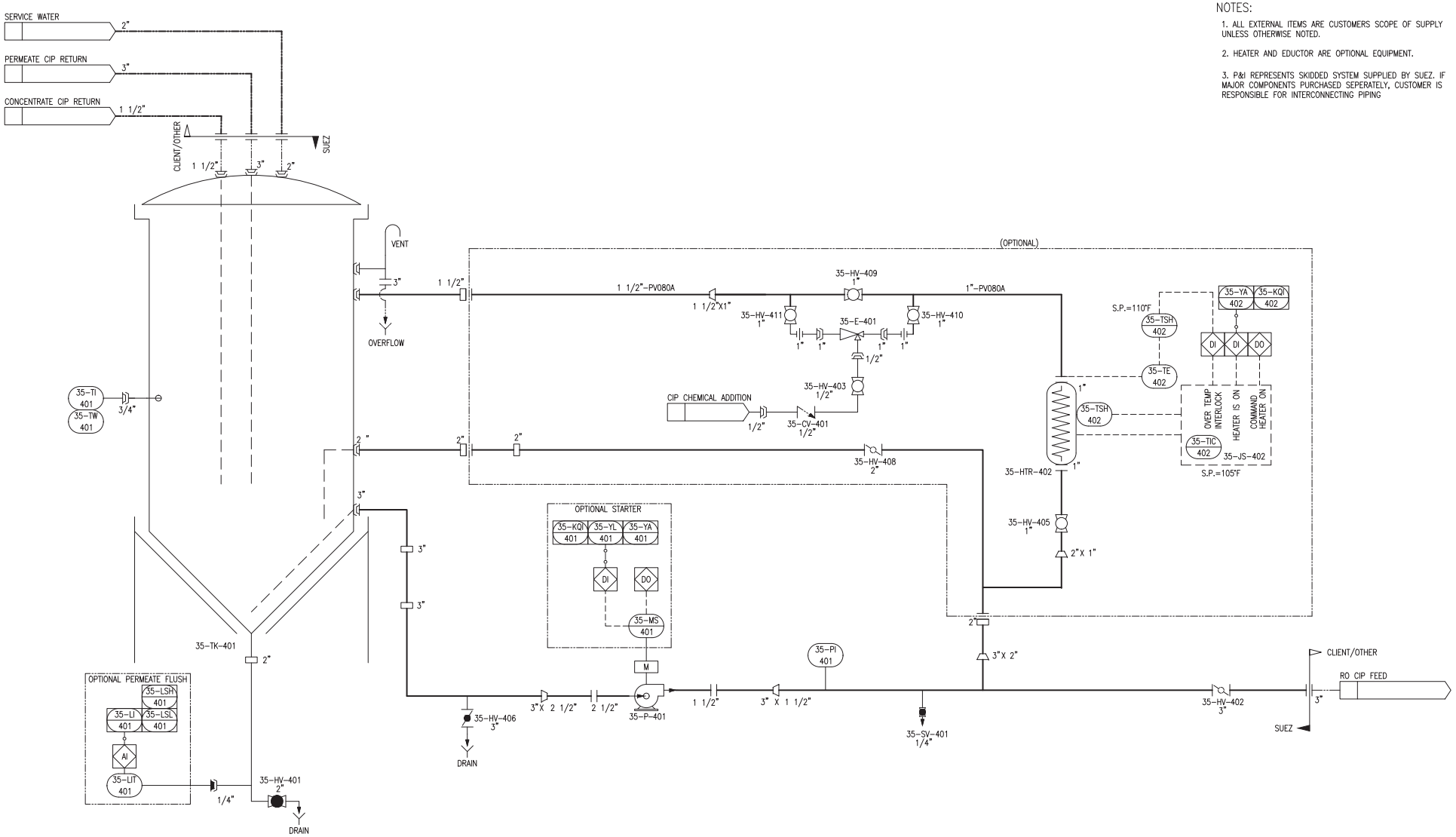
PROFLEX-RO,SYSTEM P&ID,
100GPM
CIP-18-24

DRAWING NUMBER	REVISION
1318217	C

REF.: -
DOC. OWNER: -

PROJECT NO.	PART/MATERIAL NO.	SCALE	SIZE	SHEET
	3167060		D	2 OF 3

FILE LOCATION: C:\...\ADB\Visio\1318265 REV C\1318000_1318217.dwg
LAST SAVED: Wednesday, December 11, 2019 5:01:11 PM



NOTES:

1. ALL EXTERNAL ITEMS ARE CUSTOMERS SCOPE OF SUPPLY UNLESS OTHERWISE NOTED.
2. HEATER AND EDUCTOR ARE OPTIONAL EQUIPMENT.
3. P&I REPRESENTS SKIDDED SYSTEM SUPPLIED BY SUEZ. IF MAJOR COMPONENTS PURCHASED SEPERATELY, CUSTOMER IS RESPONSIBLE FOR INTERCONNECTING PIPING

ONE (1) 100%-CIP TANK
TAG : 35-TK-401
VOLUME: 300 GAL
DIMENSIONS: 48"D X 59.56"H
MATERIAL: HDPE
MODEL: NORWESCO, 300 GAL CONE BOTTOM

ONE (1) 100%-CIP PUMP
TAG : 35-P-401
FLOW: 135 GPM @ 111 FEET
MOTOR: 7.5 HP - 3500 RPM - 480VAC/3PH/60HZ
MODEL:GOULDS 15SH06C7HT3E2

ONE (1) 100% EDUCTOR
TAG : 35-E-401
FEED WATER FLOW: ~ 10 GPM @ 40 PSID
CHEMICAL EDUCTION: 2.3 GPM
MODEL:MAZZEI M885X-2-PVDF

ONE (1) 100% INLINE HEATER
TAG : 35-HTR-402
12KW-480VAC/3PH/60HZ
MODEL:CHROMOLOX.NWHIS-03-012PE4FT18-Pt/c(J)

REV	DESCRIPTION	ECO	DWN	APPR	APPR	DATE
C	PUMP MODEL NO. UPDATED	135003	MR	SKS	CJ	04 Dec 19
B	UPDATED TANK DRAIN VALVES TAG	134446	TG	SR	JM	19 Aug 19
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CUSTOMER INFORMATION

PROFLEX-RO,SYSTEM P&ID,
100GPM
CIP-18-24

DRAWING NUMBER	REVISION
1318217	C

REF.: -
DOC. OWNER: -

PROJECT NO.	PART/MATERIAL NO.	SCALE	SIZE	SHEET
	3167060		D	3 OF 3

LAST SAVED: Wednesday, December 11, 2019 5:01:11 PM

FILE LOCATION: C:\...\ASSY.wall.1318263.REV.F.DI.3100.03.1318217.dwg

Appendix F

UV Oxidation Lamp

NeoTech Aqua

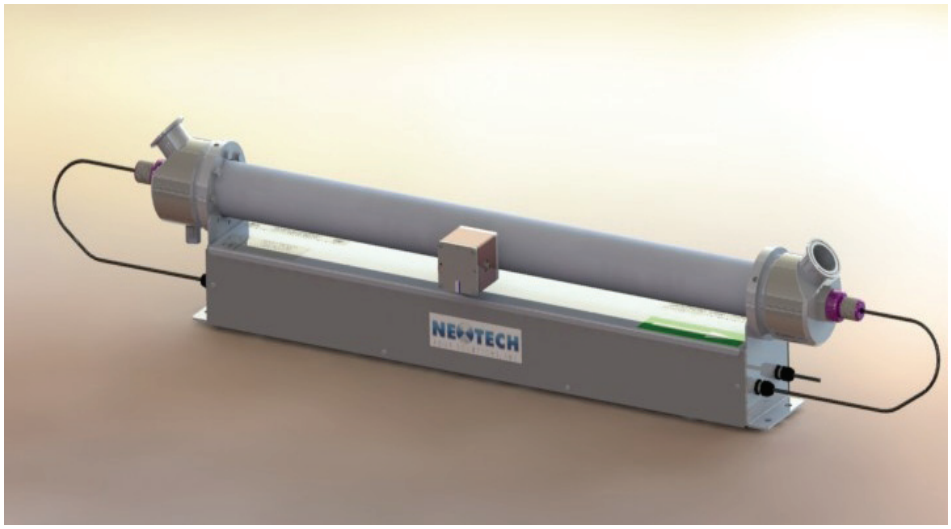
Solutions

NEOTECH™
AQUA SOLUTIONS
The World's Most Advanced UV Technology™

NeoTech T238™

TOC Reduction

• Pharmaceutical • Microelectronics



The NeoTech T238™ is specially designed to remove TOCs in high-purity water treatment applications.

This high-efficiency UV system utilizes NeoTech Aqua's patented ReFleX™ chamber technology, reflecting over 99% of the 254nm UV generated. Further, its unique design maximizes the exposure of TOCs to the 185nm wavelength UV light that the unit generates. It is the highest efficiency, smallest footprint, and lowest operating cost UV system in the water treatment industry.

With only a single thirty-eight inch lamp, the T238™ provides users the most convenient and lowest cost service schedule of any low pressure UV system.

PRODUCT BENEFITS

- Single lamp efficiency processes up to 20 gallons per minute
- 75% smaller footprint compared to standard UV systems
- May be mounted vertically or horizontally, vertical mount recommended for best results
- Up to four units may be controlled with a single micro-control box
- Built for 120V or 230V single phase power providing for maximum flexibility
- No flow, no problem – guaranteed 60 minutes
- Water contact finish – Ra-15
- Controller – Remote
- Alarms, Remote Control, 4-20 mA output
- Real time dosimetry, 100% dosage assurance – with constant flow
- UV monitor is NIST traceable
- Sanitization in place – hot water or steam
- No-tool lamp change
- NSF Standard 50 certified
- Warranty one year parts and labor

SPECIFICATIONS

Flow Rate - gpm (m^3/hr.) - TOC Reduction	20 (4.5)
Number of High Output Amalgam Lamps	1
Lamp Life - Hours*	9000
Operating Power - watts	154
Operating Pressure - psi (bar)	150 (13)
Operating Temperature - ºF (ºC)	36 - 104 (2 - 40)
Pressure Drop - psi (bar)	0.3 (.03)
Dry Weight - pounds (kg)	42 (19.1)
Dimensions (L x H x D) - inches	39.9 x 6.2 x 8.2
Dimensions (L x H x D) - millimeters	1014 x 158 x 208
Sanitary Fittings - Standard+	1.5 in.

** Lamp life is based on a maximum of one on/off cycle per day and room temperature water.*

+ All units include sanitary tri-clamp fittings for improved reliability, sanitation, and ease of installation. Alternative connections are available upon request.

MAXIMUM UV PENETRATION

The NeoTech T238™ provides users an unparalleled level of engineering sophistication by maximizing the penetration of 185nm UV light in a unique annular design. This technical advantage also reduces the number of lamps and power requirements by up to 90% compared to standard UV systems.

MINIMAL MAINTENANCE AND SERVICE

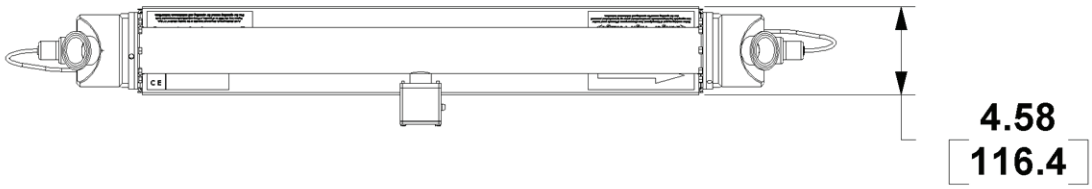
The service and maintenance requirements for the NeoTech T238™ are limited to three basic requirements:

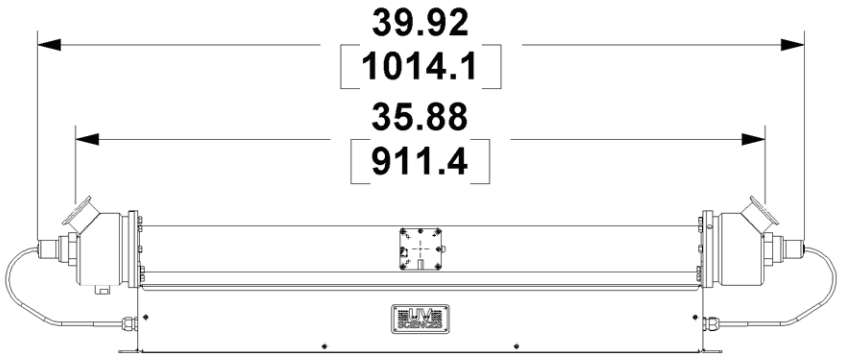
- Lamp Replacement: No Tools Required
- UV Monitor: May be changed with a single screwdriver while the system is operating
- Cleaning: May be cleaned as needed in a CIP loop or manually brushed.

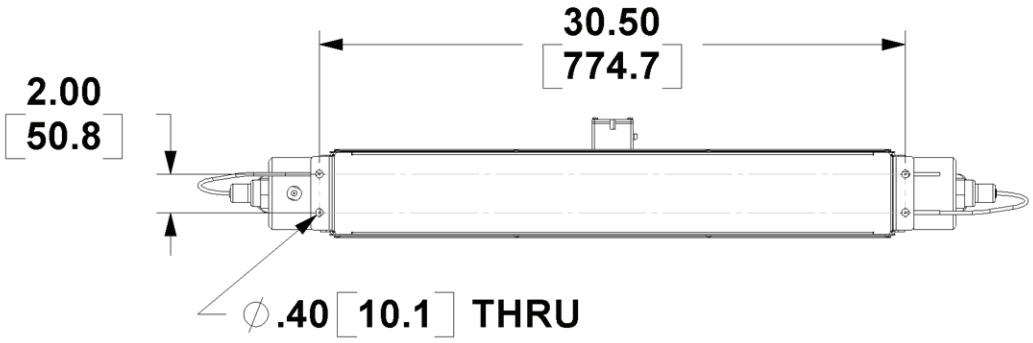
UNPARALELLED EFFICIENCY

The NeoTech T238™ boasts the smallest footprint in its class. With as few as one-tenth as many bulbs compared to standard UV systems, it has the lowest operating cost and maintenance schedule in the field.

5893 Oberlin Drive, Suite 104, San Diego, California 92121
Toll-Free 888.718.5040, ph: 858.571.6590, fx: 858.571.6596, Web: neotechaqua.com, info@neotechaqua.com



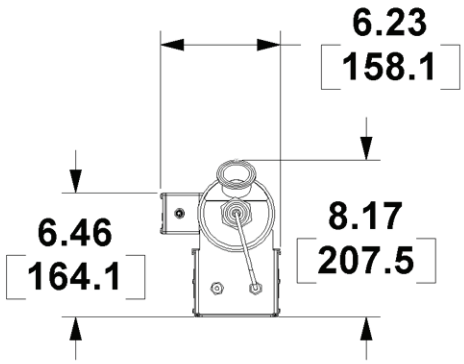




OPTIONS AND SPARES

Description	Part Number
Light Trap Kit*	UVLTK-2
Cleaning Kit	CK-2-1
Amalgam Lamp Kit	LK-38
Lamp Sleeve Kit	QSK-38
UV Monitor Calibration	UVIM-CAL
Ballast Kit, 120V	BK-120
Ballast Kit, 230V	BK-230

** Reflected UV light may be harmful to nonmetallic surfaces, such as PPL, PVC, and other plastics. If such materials are utilized in the water treatment system, a light trap is recommended.*



NEOTECH™ AQUA SOLUTIONS
The World's Most Advanced UV Technology™

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Toll-Free 888.718.5040, ph: 858.571.6590, fx: 858.571.6596, Web: neotechaqua.com, info@neotechaqua.com

Appendix F

High Service Pumps

Backwash Pumps

ITT Goulds

GOULDS PUMPS

An ITT Brand

Goulds 3196 i-FRAME®

ANSI Process Pump with i-ALERT®
Patented Intelligent Monitoring



Proven Performance



Over One Million Process Pump Installations Worldwide

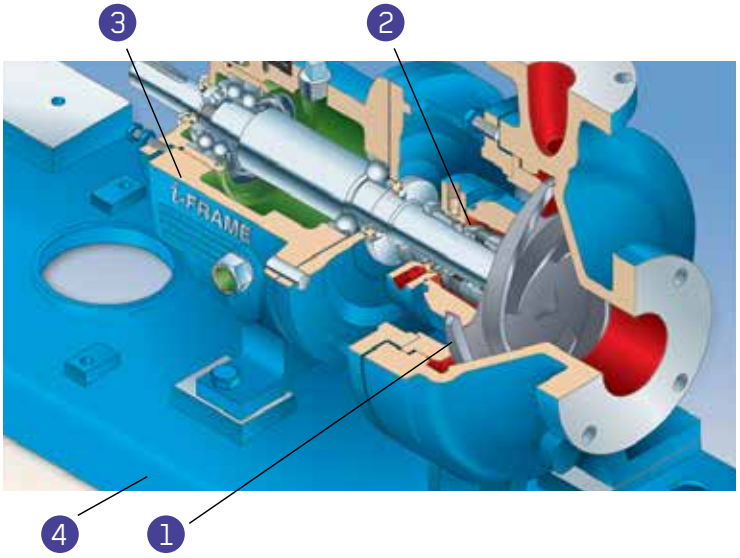
When the Goulds 3196 ANSI Standard Dimension Process Pump was first introduced in 1961, it immediately became the standard for the industry.

Today, the number of installations attest to its remarkable performance. Users in chemical, petrochemical, pulp & paper, primary metals, food & beverage and general industries know they can make no better choice than the best — Goulds Model 3196.

Before Selecting A Process Pump

Consider the Four Design Features For Extended Pump Performance

In order to select a chemical process pump wisely, consideration must be given to design features that provide long-term reliable performance. The pump must be designed for optimum shaft seal and bearing life to prevent the failure of these two primary causes of pump downtime.



FULLY OPEN IMPELLER

Best design for the Chemical Process Industries services. Ideally suited for corrosives and abrasives, handles solids and stringy fibers with ease. Allows for simple restoration of clearances when wear takes place. Back pump-out vanes reduce pressure on the shaft seal, reduce axial thrust on the bearings.



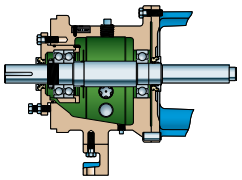
ENGINEERED SEAL CHAMBERS

BigBore™ and TaperBore™ PLUS seal chambers allow seals to run cooler with better face lubrication. Keep solids, air and vapors away from the seal faces for extended seal life.



i-*FRAME*® POWER ENDS

Patented design maximizes reliability and Mean Time Between Failure (MTBF). Severe-duty bearings increase bearing life 2-5 times, while onboard condition monitor gives visible indication of general pump health. Backed by a five-year standard warranty.



PUMP MOUNTING SYSTEM

Critical for reliability ... rigid baseplate prevents distortion, maintaining pump/motor alignment; corrosion resistant in severe environments. Designed for low vibration and to withstand pipe loads. Meets total range of plant requirements, easier installation and maintenance.



❶ Impeller

Must be designed for long-term, maintainable performance and minimum hydraulic loads for maximum reliability.

❷ Seal Chamber

Must be designed for favorable seal environment — proper heat dissipation and lubrication of seal faces. The design must also be able to handle tough services: liquids containing solids, air or vapors.

❸ Power End

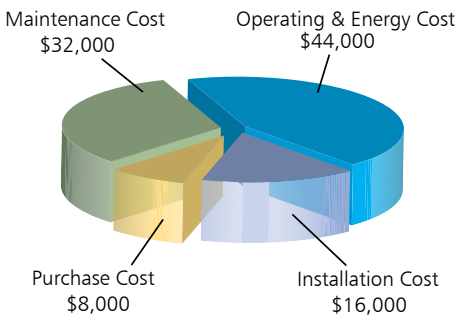
Must be designed for optimum bearing life, effective oil cooling, and minimum shaft deflection. Onboard condition monitoring provides early warning of potential failures, before they occur.

❹ Baseplate

Must be rigid, and able to withstand forces and moments of plant piping systems.

Consider the Total Cost of Ownership

Consider the fact that over a 20-year ANSI pump life, 92% of the total costs are maintenance, operation and installation. Only 8% is the initial pump purchase cost. Select a process pump that maximizes reliability (low maintenance cost), has long-term maintainable hydraulic performance (low operating cost) and is installed on a rigid baseplate. Energy and maintenance costs during the life of a process pump can be more than 10 times its purchase price.



Fully Open Impeller

Acknowledged Best Design for CPI Services

The open impeller is the acknowledged best design for process services. It is ideally suited for corrosive/erosive liquids containing solids and stringy materials. The most reliable pumps feature open impellers as standard.

See The Difference

Goulds had performance in mind when the Model 3196 standard dimension process pump was developed in 1959. Of timely significance was the decision to feature a fully open impeller rather than an enclosed type. There are three excellent reasons why:

- Greater wear area for longer life
- Renewable performance for reduced repair costs
- Minimum hydraulic loads for maximum mechanical reliability



Open Impeller Enclosed-type Impeller

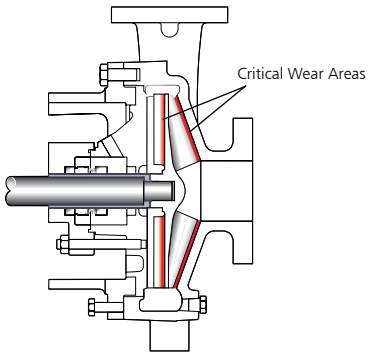
1. Two Times More Wear Area

Longer Life, Reduced Repair Costs

The most critical wear areas of a pump are the casing and stuffing box/seal chamber clearances. At a given wear rate, the larger wear area means longer life.

Open Impeller

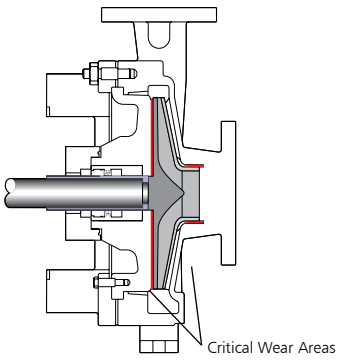
Wear is uniform throughout larger area; no concentrated wear... extended life, reduced repair part cost.



Wear Area Calculation (10 inch dia. impeller)
Area Wear Surface = $\pi r^2 = \pi(5)^2 = 79$ in^2
Total Wear Area (Front & Back) = 2x 79 = 158 in^2

Enclosed Type Impeller

Less wear area with concentrated wear at nose of impeller … higher repair part cost.

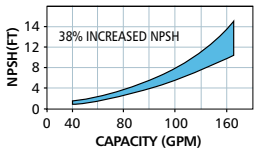


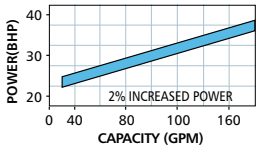
Area Nose Ring = $2\pi rW = 2 x\pi x(.9)(.9) = 5$ in^2
Area Back Cover = $\pi r^2 = \pi(5)^2 = 79$ in^2
Total Wear Area = 5 + 79 = 84 in^2

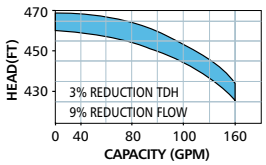
2. Maintained High-Performance

Long Pump Life

It is common knowledge that as a pump wears, the performance decreases. Goulds open impeller can be adjusted, simply and quickly, to compensate for wear and renew performance. The enclosed type impeller cannot be adjusted. Performance renewal requires new or repaired casing and impeller.



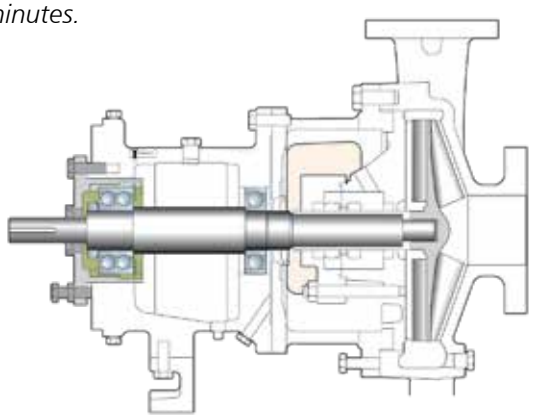




Typical reduction in performance due to wear (.010 inch per year) on any ANSI pump.

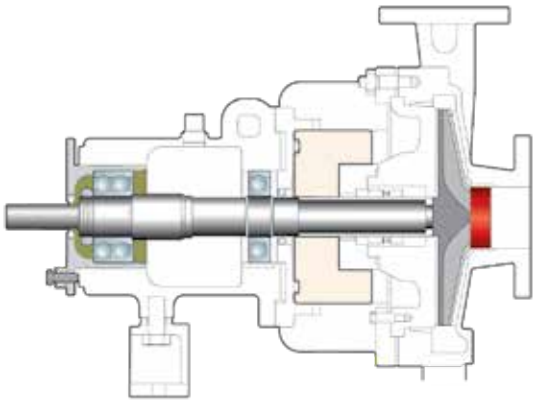
Open Impeller

Original performance can be re-set (at the bench or on-site) with external impeller adjustment using a common open-end wrench and feeler gauge. *It is done in a matter of minutes.*



Enclosed Type Impeller

Front nose ring of impeller cannot be adjusted to provide 'as new' performance. Parts must be replaced or repaired.



3. Minimum Hydraulic Loads

Extended Seal and Bearing Life

Goulds open impeller is engineered to assure minimum radial and axial thrust loads; controlled clearances between front and back of impeller minimize radial loads; back pump-out vanes control and reduce axial thrust. Bearing life is guaranteed.

Engineered For Long Life

Back vane height/angle and shroud design are engineered to minimize hydraulic loads throughout the life of the pump. Bearing life is guaranteed.

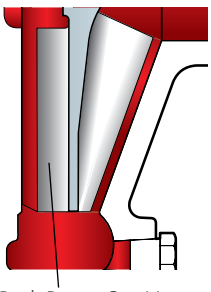
As the open impeller is adjusted and performance renewed, back pump-out vanes control axial thrust.

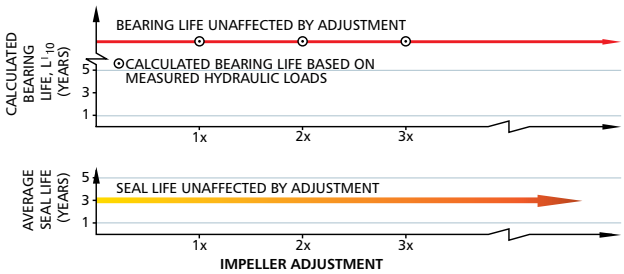
Bearing and seal life are maintained — unaffected by adjustment.

- Control Axial Thrust
- Low Radial Loads
- Control Seal Chamber Pressure



- Guaranteed Bearing Life
- Extended Seal Life





Goulds Engineered Seal Chambers

Extend Seal Life And Lower Maintenance Costs

Seal Environment is Critical for Extended Seal Life

The number one cause of pump downtime is failure of the shaft seal. These failures are normally the result of an unfavorable seal environment such as improper heat dissipation (cooling), poor lubrication of the seal faces, or seals operating in liquids containing solids, air or vapors.

Goulds engineered seal chambers are designed to provide the best seal environment for any sealing arrangement.

Enlarged bore seal chambers (BigBore™ and TaperBore® PLUS) with increased radial clearance between the mechanical seal and seal chamber provide better circulation of liquid to and from seal faces. Improved lubrication and heat removal extend seal life and pump uptime. The bottom line is lower maintenance costs.

Engineered Seal Chamber Selection Guide

A Ideally suited
B Acceptable
C Not Recommended

	Service												
	Water-Based Liquids with Flush	Entrained Air or Vapor	Solids 0-10%, no Flush	Solids Greater than 10% with Flush	Paper Stock 0-5%, no Flush	Paper Stock 0-5%, with Flush	Slurries 0-5%, no Flush	High Boiling Point Liquids, no Flush	Temperature Control	Self-Venting and Draining	Seal Face Heat Removal	Molten or Polymerized Liquid, no Flush	Molten or Polymerized Liquid with Flush
 **Standard Bore** *Designed for packing. Also accommodates mechanical seals.*	A	C	C	B	C	B	C	C	C	C	C	C	C
 **BigBore™** *Enlarged chamber for increased seal life through improved lubrication and cooling.*	A	B	C	A	C	A	C	C	C	B	A	C	C
 **Patented TaperBore™ *PLUS*** *Lower seal face temperatures, self-venting and draining. Solids and vapors circulated away from seal faces.*	A	A	A	C	A	—	A	A	C	A	A	C	C
 **Jacketed Patented TaperBore™ *PLUS*** *Maintains proper temperature control (heating or cooling) of seal environment.*	A	A	A	C	—	—	A	A	A	A	A	A	A
 **Jacketed BigBore™** *Maintains proper temperature control (heating or cooling) of seal environment.*	A	B	C	A	—	—	C	C	A	C	A	A	A

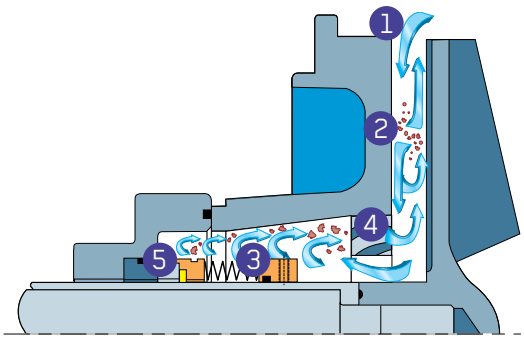
Goulds Dynamic Seal

Goulds TaperBore® PLUS

How it Works

The unique flow path created by the Vane Particle Ejector directs solids away from the mechanical seal, not towards the seal as with other tapered bore designs. And, the amount of solids entering the bore is minimized. Air and vapors are also efficiently removed.

On services with or without solids, air or vapors, Goulds Pumps TaperBore® PLUS is the effective solution for extended seal and pump life and lower maintenance costs.



1. Solids/liquid mixture flows toward mechanical seal / seal chamber.
2. Turbulent zone. Some solids continue to flow toward shaft. Other solids are forced back out by centrifugal force (generated by back pump-out vanes).
3. Clear liquid continues to move toward mechanical seal faces. Solids, air, vapors flow away from seal.
4. Enhanced streamline created by Vane Particle Ejector. Solids, air, vapor liquid mixture exit seal chamber bore.
5. Flow in TaperBore® PLUS seal chamber assures efficient heat removal (cooling) and lubrication. Seal face heat is dissipated. Seal faces are continuously flushed with clean liquid.

Benefits of Dynamic Seal:

- Eliminate use of seal water
- Eliminate pumpage contamination and product dilution
- Reduce utility cost
- Eliminate problems associated with piping from a remote source
- Eliminate need to treat seal water
- Considerably less expensive than a slurry mechanical seal




Stuffing Box Cover


Repeller


Repeller Plate

Besides being available as a complete unit, any Goulds 3196 can be easily field-converted to Dynamic Seal. Retrofit kits are available.

Eliminate Sealing Problems, Reduce Maintenance Costs

On tough pumping services, especially corrosives and slurries, mechanical seals require outside flush and constant, costly attention. Even then, seal failures are common, resulting in downtime.

Goulds Pumps offers a solution: The Dynamic Seal which, simply by fitting a repeller between the stuffing box cover and impeller, eliminates the need for a mechanical seal.

Sealless Solutions

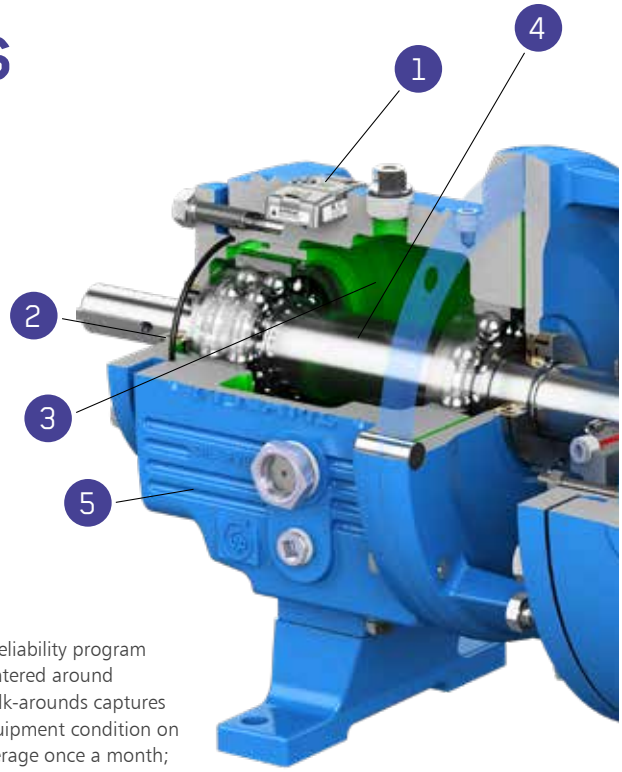
Not all process pump applications can be sealed with optimum reliability. Goulds ANSI dimensional magnetic drive sealless process pumps are perfect solutions to mechanical seal or environmental sealing problems. The 3296 EZMAG metal magnetic drive process pump has a revolutionary bearing cartridge design for maximum reliability and ease of maintenance. For tough corrosive services Goulds also offers ETFE® and PFA-lined magnetic drives available in horizontal, vertical or self-priming configurations to meet all your process needs.


Model 3296 EZMAG Model 3298 Model V3298

Goulds Patented *i-FRAME*® Power Ends

Extended Pump Life Through Intelligent Design

Goulds i-FRAME Power Ends are the result of 160 years of design experience, customer interaction, and continuous improvement. Customers get extended Mean Time Between Failure (MTBF) and lower life cycle costs (LCC) ... guaranteed!



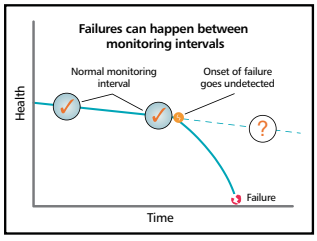
1 i-ALERT®2 Bluetooth Equipment Health Monitor



The heart of the i-Frame, the i-ALERT condition monitor unit continuously measures vibration and temperature at the thrust bearing and automatically indicates when pre-set levels of vibration and temperature have been exceeded, so that changes to the process or machine can be made before failure occurs. A visual indication of pump health makes walk-around inspections more efficient and accurate. The result is a more robust process to monitor and maintain all your ANSI pumps so that your plant profitability is maximized.

See page **16** for more information.

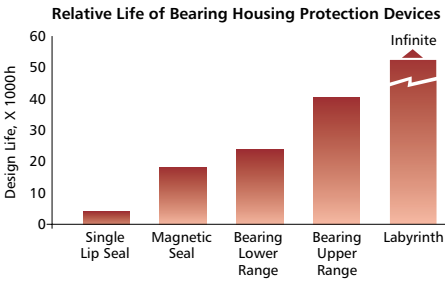
A reliability program centered around walk-arounds captures equipment condition on average once a month; the failure process, however, can begin and end quite frequently within this time period.



2 Inpro VBXX-D Hybrid Bearing Isolators

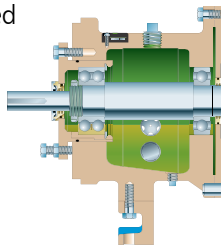
Most bearings fail before reaching their potential life. They fail for a variety of reasons, including contamination of the lubricant. INPRO VBXX-D has long been considered the industry standard in bearing lubricant protection. The i-FRAME now improves upon that design by offering stainless steel rotors, for maximum protection against contaminants and the corrosive effects of seal leakage or environmental conditions. These seals are non-contacting and do not wear.

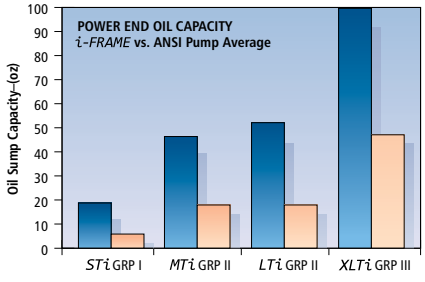




3 Optimized Oil Sump Design

Internal sump geometry is optimized for longer bearing life. Sump size increased by 10%-20% results in better heat transfer and cooler bearings. Contoured design directs contaminants away from bearings, to the magnetic drain plug for safe removal.



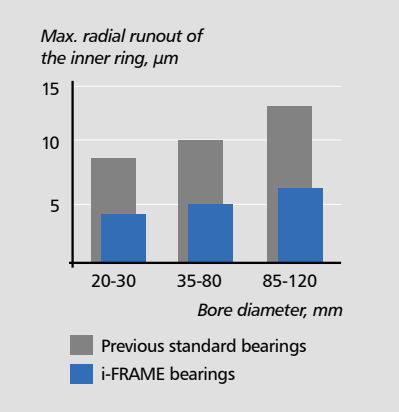




Larger *Means Cooler*
GOULDS
Industry Average

4 Shaft and Bearings Engineered for Maximum Reliability

Every 3196 i-Frame Power End is engineered and manufactured for optimal pump performance and increased MTBF.



The rugged shaft and bearing combination maintains shaft deflection of less than 0.002 inches at all operating points. The result is longer seal and bearing life.

Premium severe-duty thrust bearings increase bearing fatigue life.

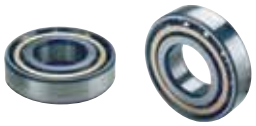
- High purity steels have fewer inclusions than standard steel – better grain structure and wear resistance.
- Heat treatment of bearing elements to SO stabilizaion levels provides superior thermal stability for increased service life.
- Bearing Balls are manufactured to at least one ISO grade above standard (ISO P5 for ring running accuracy and ISO P6 for dimensions). The result is reduced vibration and noise for improved shaft guidance.

5 *LTi* Power End for High Load Applications

Increased L'10 Bearing Life 150% to 200% on the Toughest Applications

Ideal for tough conditions when a power end is pushed beyond ANSI limits; operating at low flows and higher heads, pumping high specific gravity liquids, fluctuating process conditions, overhung belt drive.

Oversized shaft and bearing assembly significantly expands the limits for long, trouble-free bearing and seal life. On high load applications, the *LTi* power end improves bearing life 150% - 200%; oil operating temperature reduced by 45°F (25°C).

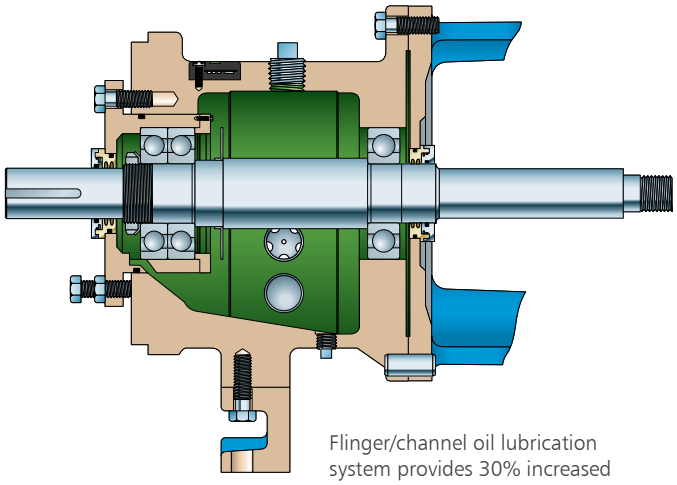


Duplex thrust bearings (40°/40° angular contact) with machined brass cages, are ideally sized for high load applications.



Oversized shaft with duplex thrust bearings provide increased L'10 by 40%.

ANSI B73.1 Shaft Specification	Meets	Exceeds
Diameter Tolerance		✔
Surface Finish		✔
Runout	✔	
Deflection		✔



Flinger/channel oil lubrication system provides 30% increased L'10 life; 15°F (8°C) reduced oil temperature.

Our Guarantee

We are so confident that the i-*FRAME* is the most reliable Power End in the industry, that we are proud to offer a standard 5-year warranty on every i-*FRAME* ANSI Process Pump.

3196 i-FRAME® Process Pumps

i-*ALERT*® 2 EQUIPMENT HEALTH MONITOR
Constantly measures vibration and temperature at the thrust bearing. Colored LED's indicate general pump health. Provides early warning of improper operation before catastrophic failure occurs.

See page **16** for more information.)

CONTINUOUS PERFORMANCE
Original flow, pressure and efficiency are maintained by simple external adjustment resulting in long-term energy and repair parts savings.

PREMIUM SEVERE-DUTY THRUST BEARINGS
Premium bearings using improved tolerances and cleaner steel provide reduced assembled runout and longer bearing life.

INPRO VBXX-D HYBRID LABYRINTH SEALS
Prevents premature bearing failure caused by lubricant contamination or loss of oil. Stainless steel rotors for optimal performance in corrosive environments.

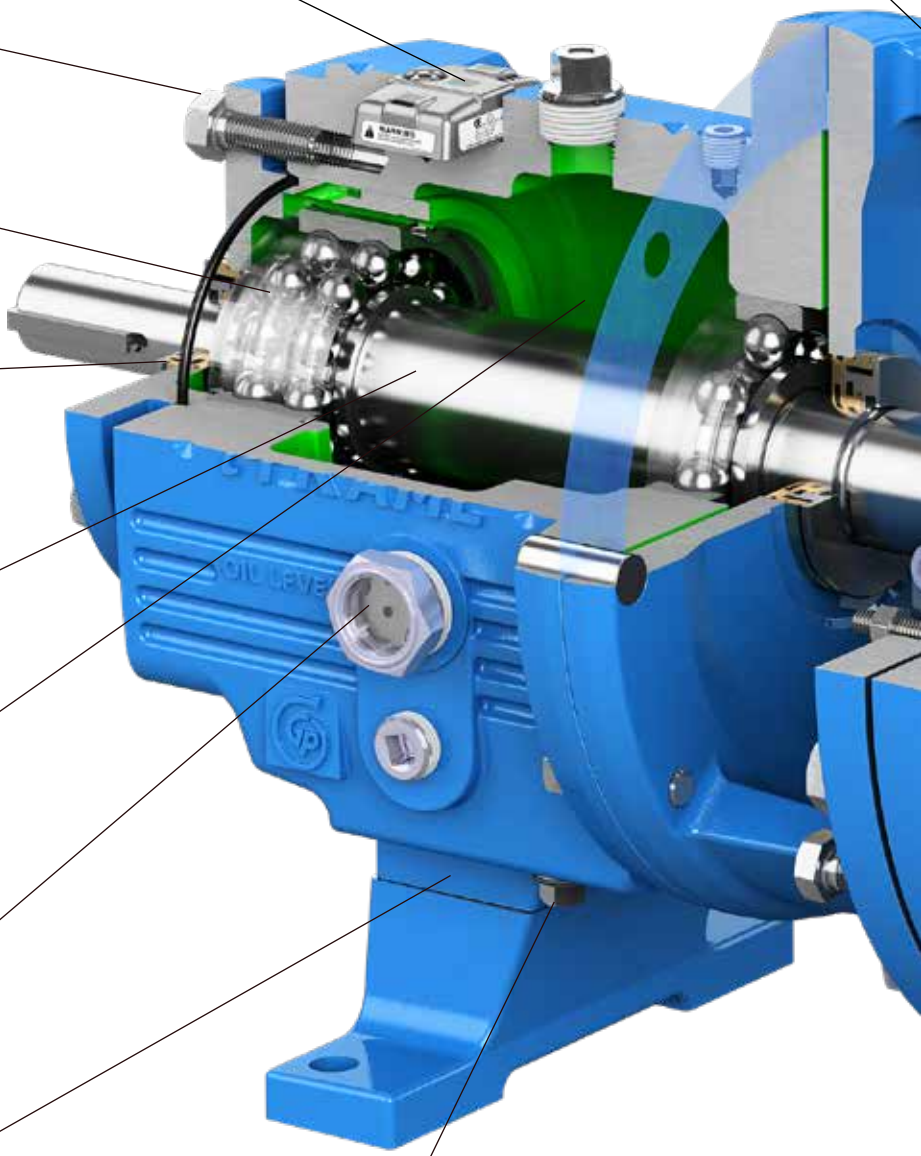
HEAVY DUTY SHAFT AND BEARINGS
Rigid shaft designed for minimum deflection at seal faces—less than 0.002 in. (.05 mm). Bearings sized for 10-year average life under tough operating conditions. Available with or without shaft sleeve.

OPTIMIZED OIL SUMP DESIGN
Increased oil capacity provides better heat transfer for reduced oil temperature. Bearings run cooler and last longer. Contaminants directed away from bearings to magnetic drain plug.

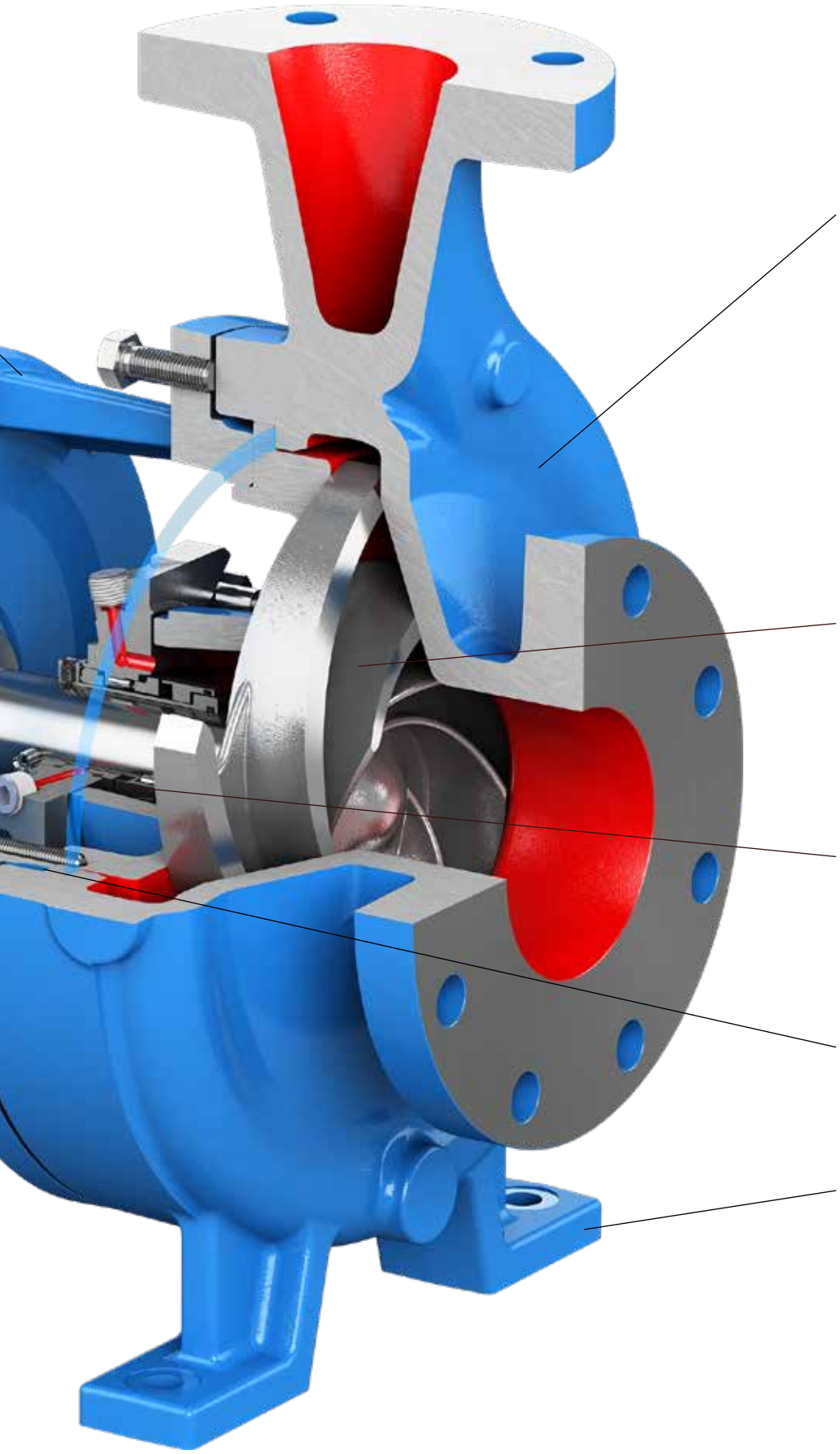
ONE - INCH BULL'S EYE SIGHT GLASS
Assures proper oil level critical to bearing life. Can be mounted on either side of pump for installation flexibility.

i-*FRAME*® POWER END
Designed for reliability and extended pump life, backed with a 5-year warranty.

DUCTILE IRON FRAME ADAPTER
Material strength equal to carbon steel for safety and reliability.



MAGNETIC DRAIN PLUG
Standard magnetic drain plug helps protect bearings and prolong life.



CASING

- Bonus casing thickness: Class 150 pumps feature Class 300 wall thickness as standard; increased reliability and maximized casing life.
- Top centerline discharge for air handling, self venting.
- Back pull-out design for ease of maintenance.
- Integral casing feet prevent pipe load misalignment – maximized seal and bearing life.
- Serrated flanges standard for positive sealing against leakage. Meets ANSI B16.5 requirements. Class 150 FF flanges standard, optional Class 150 RF, 300 FF/RF.

FULLY OPEN IMPELLER

Acknowledged best design for CPI services – solids handling, stringy material, corrosives, abrasives. Two times the wear area of closed-type impellers for longer life. Back pump-out vanes reduce radial thrust loads and seal chamber pressure.

SEALING FLEXIBILITY

Wide range of sealing arrangements available to meet service conditions. Engineered seal chambers improve lubrication and heat removal (cooling) of seal faces for extended seal life and pump uptime.

POSITIVE SEALING

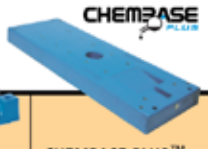
Fully confined gasket at casing joint protects alignment fit from liquid, makes disassembly easier.

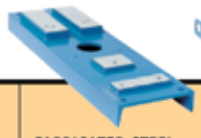
RIGID FRAME (AND CASING) FEET

Reduce effects of pipe loads on shaft alignment; pump vibration reduced.

Baseplate Mounting Systems

Goulds Pumps offers a complete range of pump mounting systems to meet plant requirements; make installation and maintenance easier.






Baseplate Selection Guide	**CAMBER TOP CAST IRON** Preferred standard of process industries. Rigid and corrosion resistant, it is the best value in the industry today.	**CHEMBASE PLUS™** Polymer concrete construction provides exceptional rigidity & corrosion resistance. ANSI 1991 dimensional.	**FABRICATED STEEL** An economical choice that meets ANSI/ASME B73.1 dimensional requirements.	**ENHANCED FEATURE FABRICATED STEEL** Upgraded ANSI baseplate designed to maximize pump operation life and ease installation. Meets API-minded chemical pump users' toughest requirements.	**ADVANTAGE** Heavy duty PIP compliant fabricated steel baseplate.	**POLYSHIELD ANSI COMBO** Heavy duty polymer concrete combination baseplate and foundation.
PLANT REQUIREMENTS						
Corrosion Resistance (mild/moderate)	■	■	■	■	■	■
Corrosion Resistance (severe)		■			□	■
Machined Pump & Motor Parts	■		■	■	■	□
Circular Grout Holes (4 in. min.)	■	■	■	■	■	■
Vent Holes (1 in. min.)	■					■
Vent Holes (1/2 in. min.)		■		■	■	
Non-Overhang				■	■	
Full Drain Rim				■	■	
Built-in Drain Pan (under pump)		■				■
Drain Pan Under Pump	□		□		■	■
Baseplate Leveling Screws		□		□	□	
Motor Alignment Adjusters	□	□	□	□	□	□
Lifting Feature				■	■	
Continuous Welding Used				■	■	
Flexibly Mounted	□	□	□			
Spring Loaded*			□			
Available in 304 and 316 SS			□	□	□	
ANSI B73.1-1991 Conformance			■	■		
API-610 Conformance					□	
PIP RESP 002 Conformance					■	

■ STANDARD □ OPTIONAL *Engineered option—requires special baseplate

Bonus Interchangeability

i-**FRAME** Power Ends Fit 7 Different Process Pumps

Minimize inventory, reduce downtime.



3196 i-*FRAME*
Process Pumps



3198 i-*FRAME*
PTFE Lined
Process Pumps



CV 3196 i-*FRAME*
Non-Clog
Process Pumps



3796 i-*FRAME*
Self-Priming
Process Pumps



HT 3196 i-*FRAME*
High Temperature
Process Pumps



NM 3196 i-*FRAME*
Non-Metallic
Process Pumps



LF 3196 i-*FRAME*
Low Flow ANSI
Process Pumps

Options

Goulds Pumps offers a complete range of pump mounting systems to meet plant requirements; make installation and maintenance easier.

Seal Flush Plans

All ANSI B73.1 seal flush and cooling plans are available to control emission levels and meet seal installation requirements of user preference.

CPI PLAN 7311

By-pass flush lubricates single seal faces.



CPI PLAN 7353

Pressurized circulation lubricates double seal faces.



High and Low Temperature Capability

Options are readily available for high and low temperature applications or where pumpage temperature must be controlled.

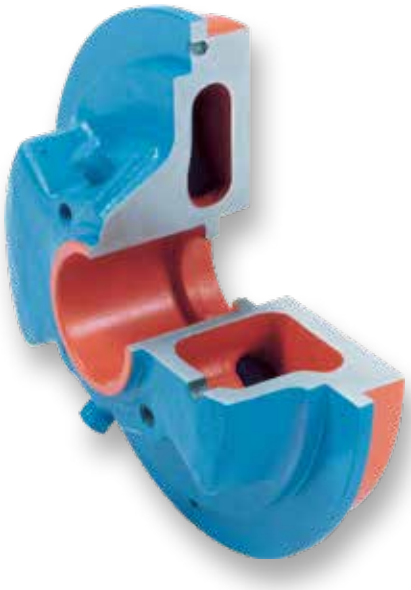
HEAT JACKET

Economical clamp-on jacket provides practical method of heating or cooling the casing. Excellent heat transfer characteristics. Easy to install or remove for pump servicing.



JACKETED SEAL CHAMBER

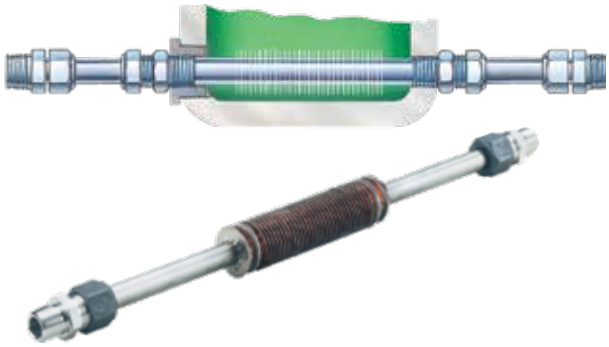
Maintains proper temperature control of sealing environment. Ideal for maintaining temperature for services such as molten sulphur and polymerizing liquids. Available in BigBore and TaperBore® designs.



BEARING FRAME FINNED COOLER

Directly cools oil for lower bearing operating temperature. Requires minimum cooling water. Corrosion resistant construction. Recommended for temperatures over 350°F (177°C) when using conventional oil. When synthetic oil is used, pump can run up to 450°F without cooling. Above 450° add for high temperature option.





i-ALERT® Monitoring Solution

Sensor | App | Ai Platform

www.i-alert.com

Bluetooth®



What it Does:

Monitor
Tracks vibration, temperature & run-time hours 24/7/365.

Alarm
Takes high resolution data when an alarm condition occurs and stores it for later analysis.

Trend
Captures data every 1-60 minutes and has up to 170 days of hourly on-board storage.

Analyze
Diagnose machine faults with vibration tools
Fast Fourier Transform (FFT) & Time Wave Form Analysis.

Environment
Rated for any industrial environment. water & dust resistant.
Intrinsically Safe with a 3-year battery life (use dependent).
- ATEX Zone 0 AEx ia IIB Ga (Groups C & D)

Wireless
Sync data via Bluetooth Smart enabled smartphones and tablets.

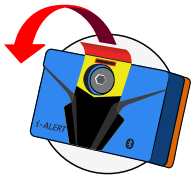
Online Monitoring
Monitor and manage all of your i-ALERT enabled machines in one place - i-ALERT Ai Online Platform. This subscription service requires no software to download or dedicated hardware to run.



Spend less time collecting data and more time fixing problems. The i-ALERT mobile app has the ability to scan multiple i-ALERT2 sensors within range to quickly and safely inspect multiple machines.

How it Works:

1. ACTIVATE
The i-ALERT2 devices are light activated by removing the sticker. The sensor begins wirelessly broadcasting once activated.



2. AUTO CONFIGURATION
The i-ALERT device averages the vibration over 25 hours of run-time and sets the alarm levels to 2 x average (0.1-1.5ips minimum). Temperature alarm default to 80°C (176°F)



OR

2. MANUAL CONFIGURATION
User manually sets the alarm thresholds via the i-ALERT mobile application.



3. Monitor
The i-ALERT2 sensor is configurable to check every 1-5 minutes. If two consecutive readings are above alarm threshold the i-ALERT device will go into alarm.





Dashboard
Simple, intuitive dashboard to track vibration, temperature, run-time & battery life.

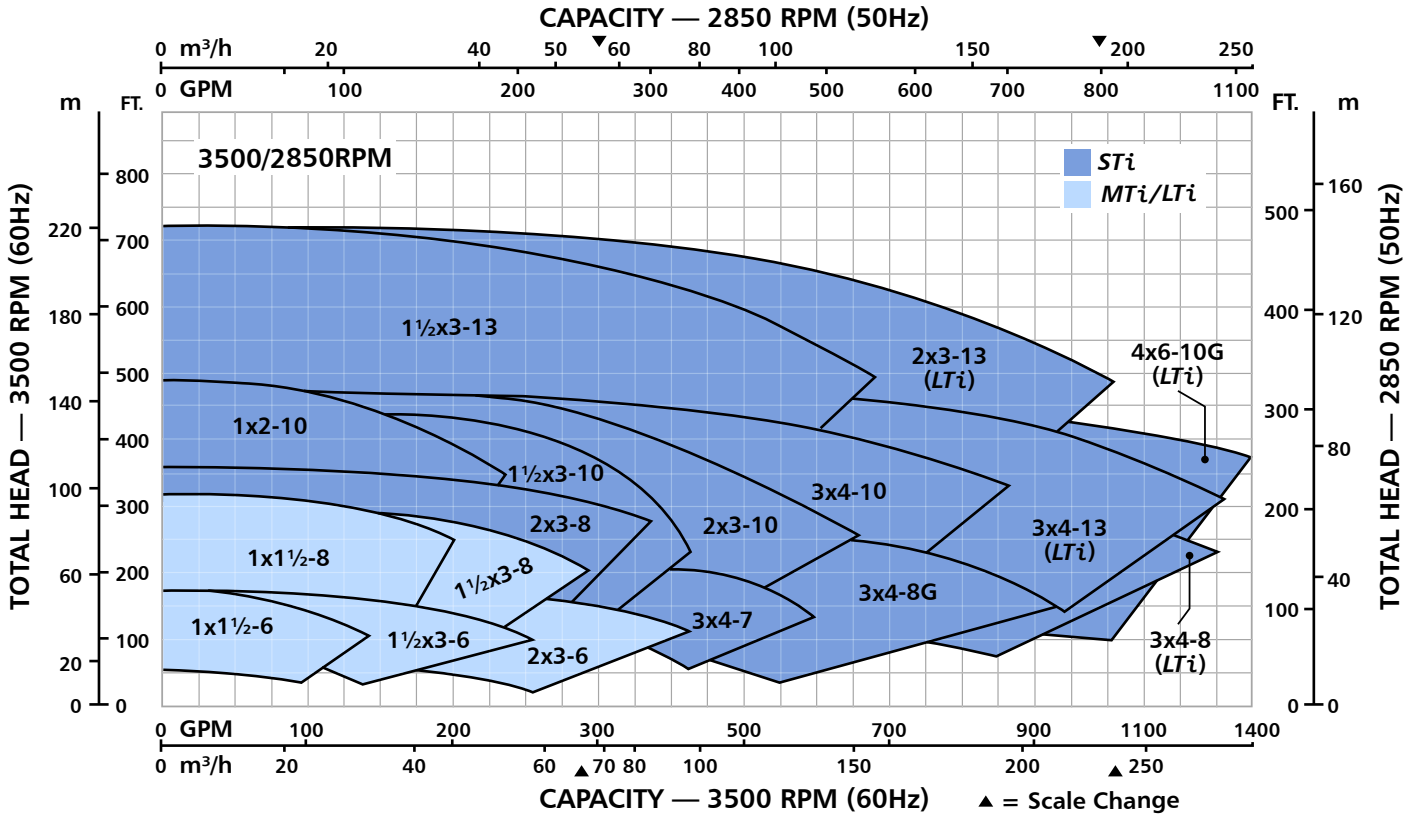


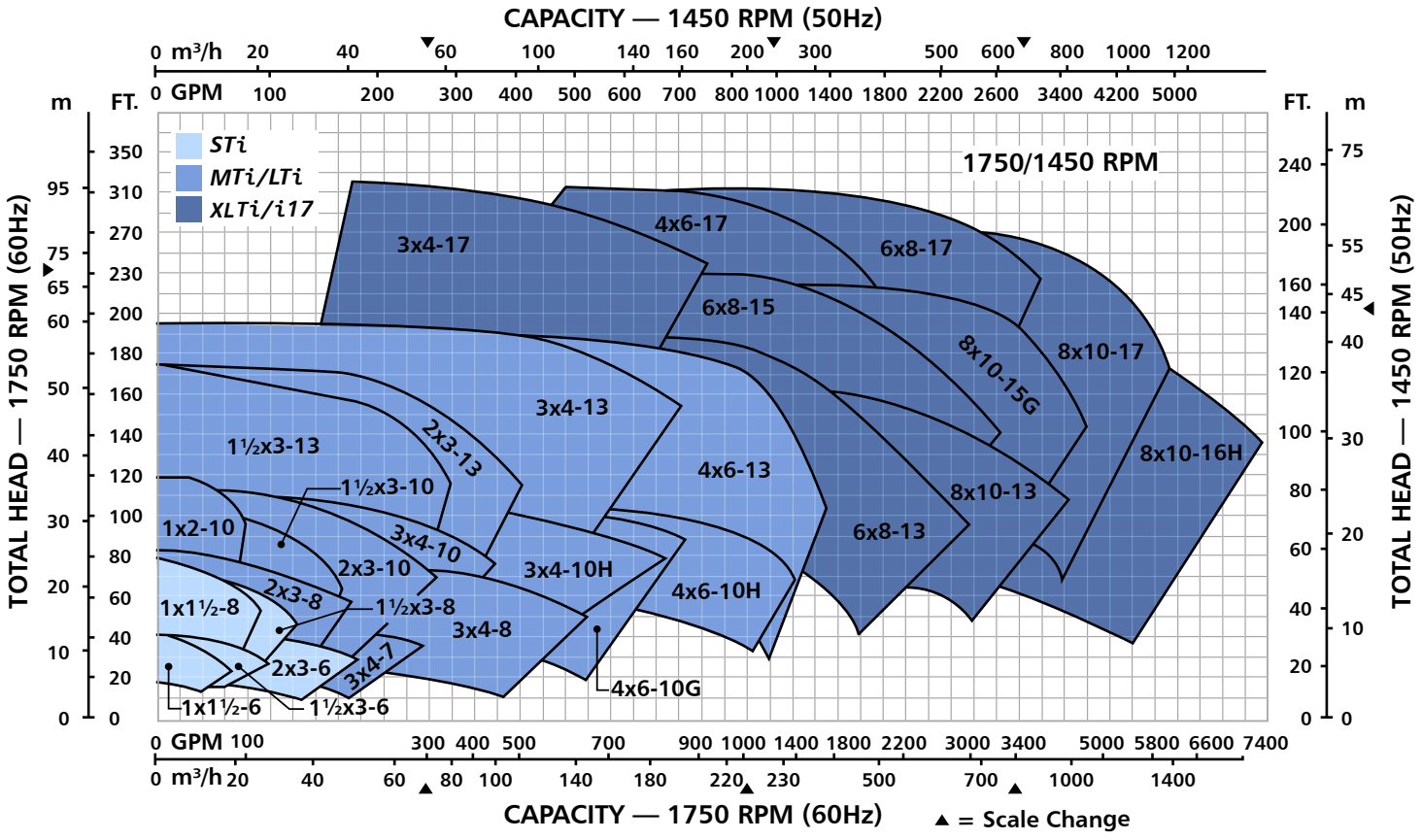
Trending
Trend vibration, temperature, & kurtosis to monitor any changes in the equipment operation.



BOM
Load the as built of materials based on the pump serial number.

Hydraulic Coverage





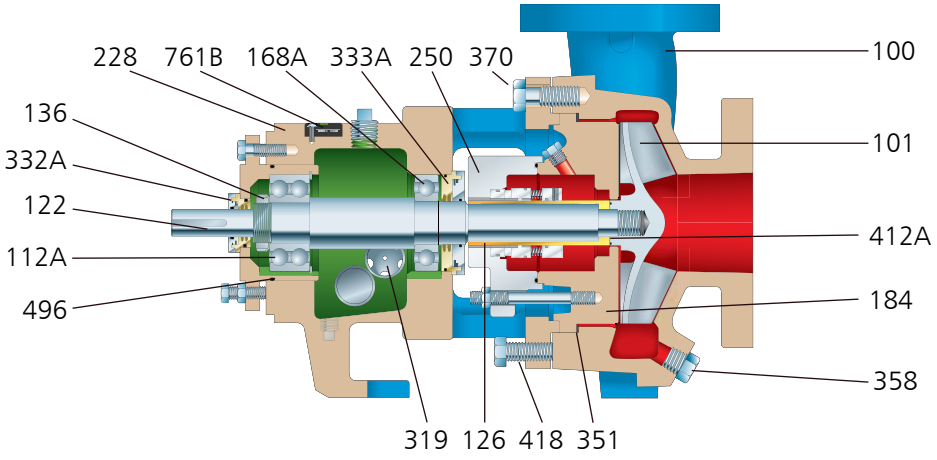
Part List and Materials of Construction

Item Number	Part Name	Material							
		Ductile Iron	316SS	CD4MCu	Alloy 20	Monel	Nickel	Hastelloy B&C	Titanium
100	Casing	Ductile Iron	316SS	CD4MCu	Alloy 20	Monel	Nickel	Hastelloy	Titanium
101	Impeller	Ductile Iron	316SS	CD4MCu	Alloy 20	Monel	Nickel	Hastelloy	Titanium
105	Lantern Ring	Glass-Filled PTFE							
106	Stuffing Box Packing	PTFE Impregnated Fibers							
108	Frame Adapter	Ductile Iron							
112A	Thrust Bearing	Double Row Angular Contact**							
122	Shaft – Less Sleeve (Optional)	316SS			Alloy 20	Monel	Nickel	Hastelloy	Titanium
122	Shaft – With Sleeve	SAE4140				316SS			
126	Shaft Sleeve	316SS		Alloy 20		Monel	Nickel	Hastelloy	Titanium
136	Bearing Locknut and Lockwasher	Steel							
168A	Radial Bearing	Single row Deep Groove							
184	Stuffing Box Cover (Packed Box)	Ductile Iron	316SS	CD4MCu	Alloy 20	Monel	Nickel	Hastelloy	Titanium
184	Seal Chamber (Mechanical Seal)	Ductile Iron	316SS	CD4MCu	Alloy 20	Monel	Nickel	Hastelloy	Titanium
228	Bearing Frame	Cast Iron (Ductile Iron for STi Group)							
250	Gland	316SS		Alloy 20		Monel	Nickel	Hastelloy	Titanium
262	Repeller/Sleeve (Dynamic Seal Option)	CD4MCu			Alloy 20	Monel	Nickel	Hastelloy	Titanium
264	Gasket, Cover-to-Backplate (Dynamic Seal)	PTFE							
370H	Stud/Nut, Cover-to-Adapter	304SS							
319	Oil Sight Glass	Glass/Steel							
332A	INPRO® VB-XX-D Labyrinth Oil Seal (Outboard)	Stainless Steel/Bronze							
333A	INPRO® VB-XX-D Labyrinth Oil Seal (inboard)	Stainless Steel/Bronze							
351	Casing Gasket	Aramid Fiber with EPDM Rubber							
358	Casing Drain Plug (Optional)	Steel	316SS		Alloy 20	Monel	Nickel	Hastelloy	Titanium
360F	Gasket, Frame-to-Adapter	Buna							
360C	Gasket, Bearing End Cover	Cellulose Fiber with Binder							
370	Cap Screw, Adapter-to-Casing	Steel							
412A	O-ring, Impeller	Glass-Filled PTFE							
418	Jacking Bolt		304SS						
444	Backplate (Dynamic Seal Option)	Ductile Iron	316SS	CD4MCu	Alloy 20	Monel	Nickel	Hastelloy	Titanium
469B	Dowel Pin, Frame-to-Adapter	Steel							
496	O-ring, Bearing Housing	Buna Rubber							
761B	i-ALERT Condition Monitor	Stainless Steel/Epoxy							

**LTi Power End features standard Duplex Angular Contact: Optional STi, MTi, XLT-i
Other Alloys Available: 316L, 317, 317L, 254SMO, Zirconium, etc.

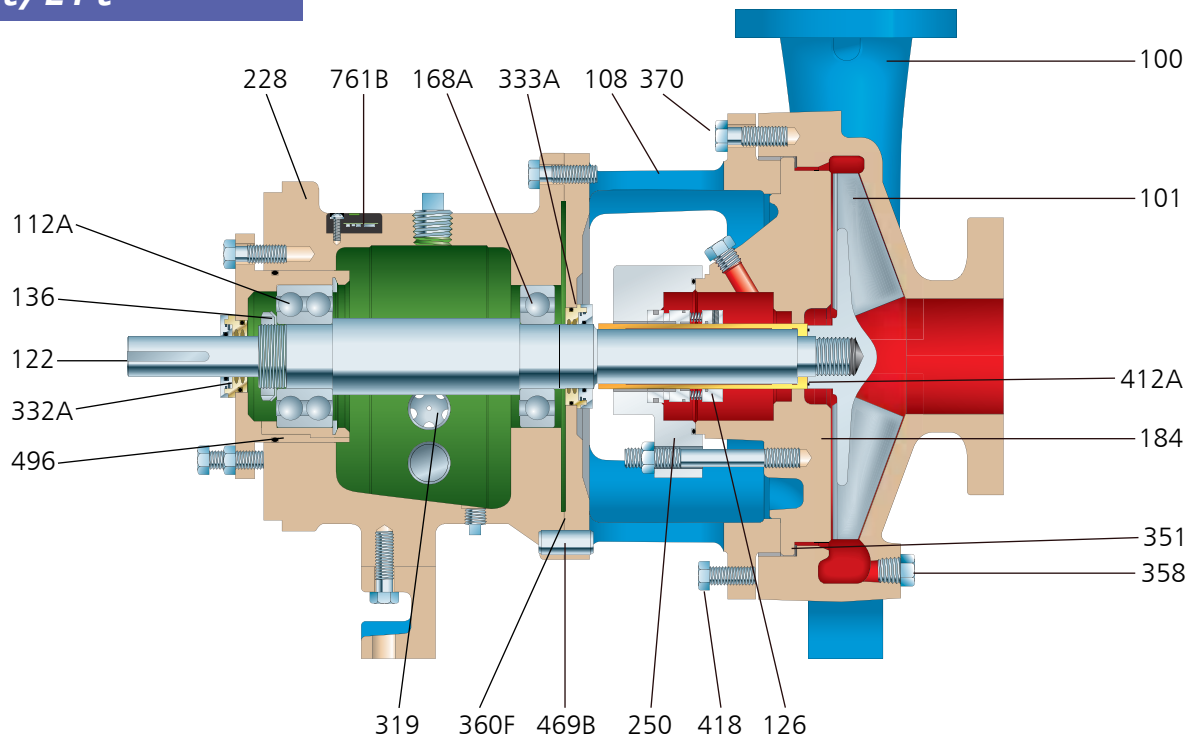
Sectional View 3196 i-FRAME

STi

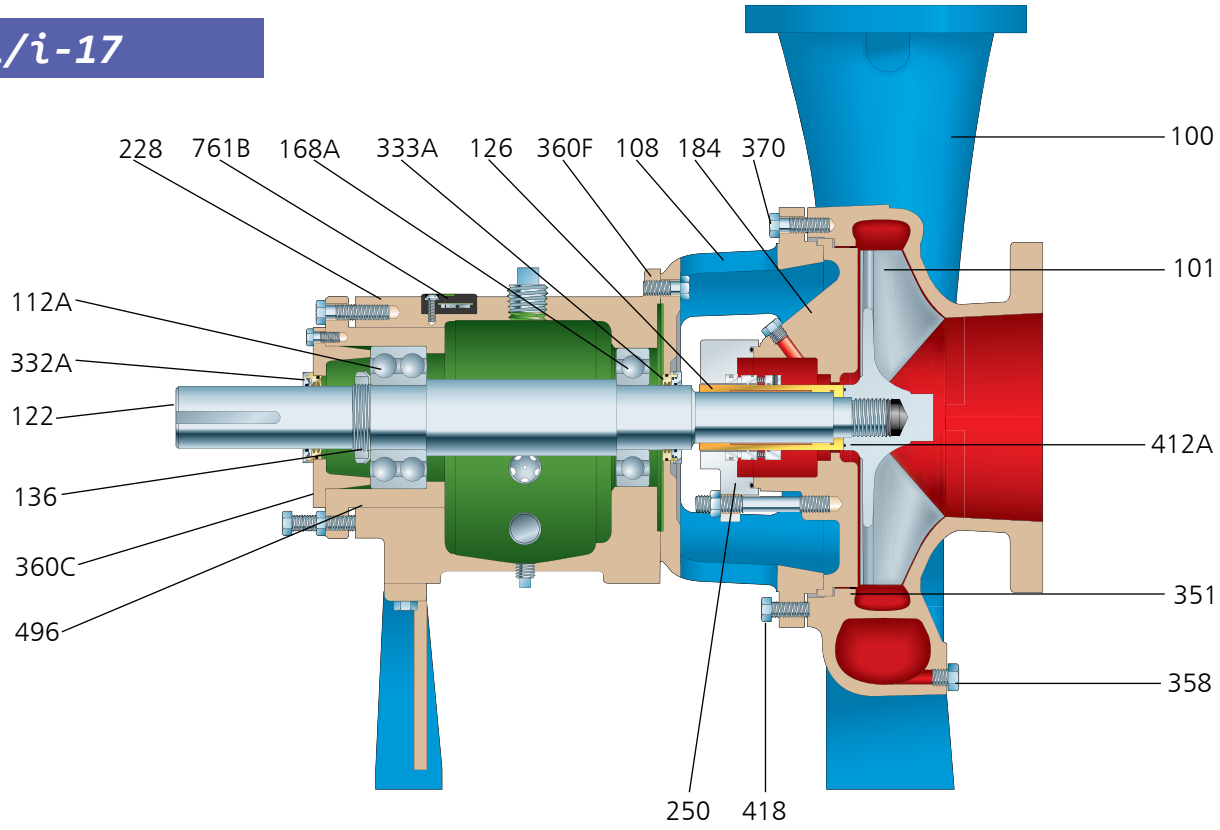


Sectional View

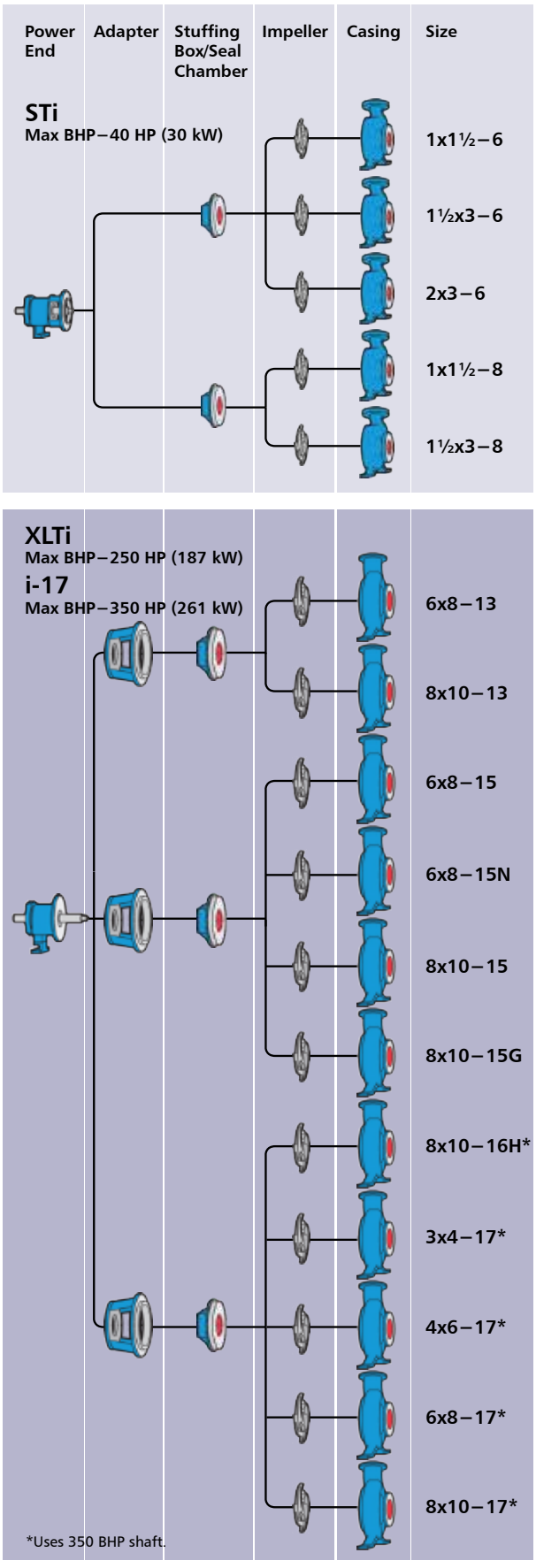
MTi/LTi

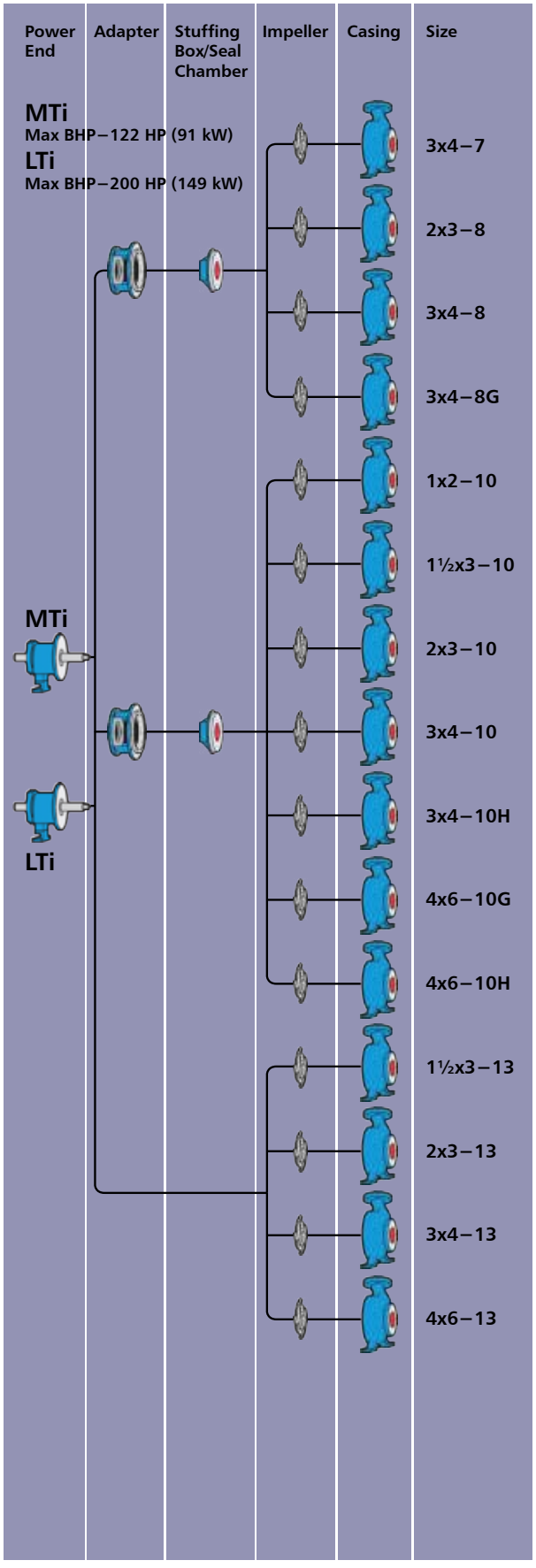


XLTi/i-17

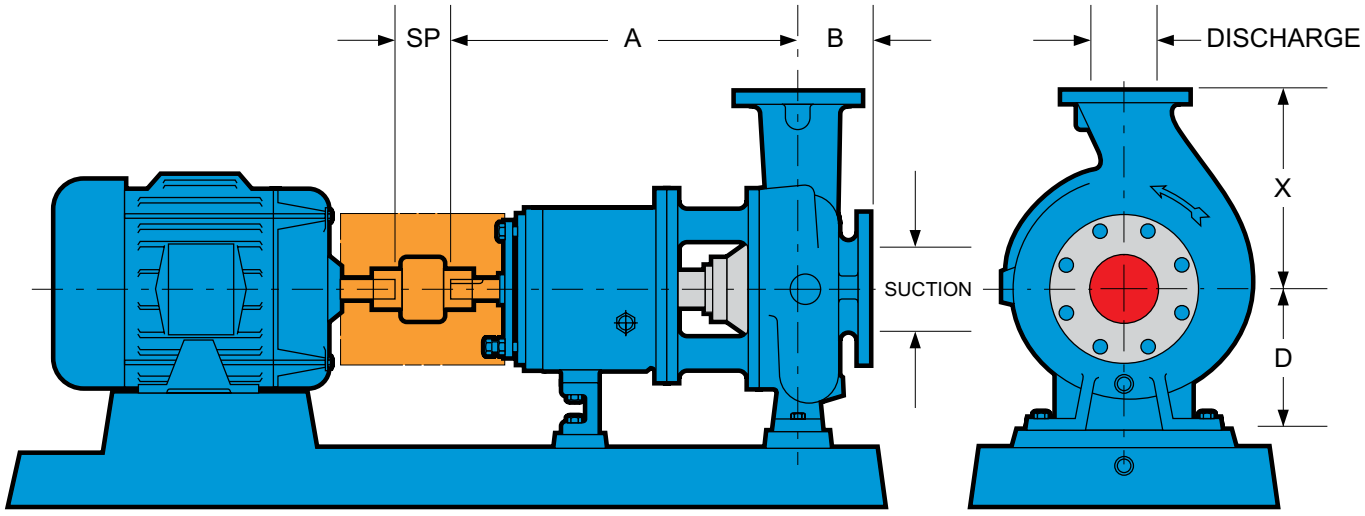


Modular Interchangeability





Dimensions



DIMENSIONS										
Group	Pump Size	ANSI Designation	Discharge Size	Suction Size	X	A	B	D	SP	Bare Pump Weight Lbs. (kg)
STi	1x1½-6	AA	1	1½	6.5 (165)	13.5 (343)	4 (102)	5.25 (133)	3.75 (95)	84 (38)
	1½x3-6	AB	1½	3						92 (42)
	2x3-6	AC	2	3						95 (43)
	1x1½-8	AA	1	1½						100 (45)
	1½x3-8	AB	1½	3						108 (49)
MTi/LTi	3X4-7	A70	3	4	11 (280)	19.5 (495)	4 (102)	8.25 (210)	3.75 (95)	220 (100)
	2X3-8	A60	2	3	9.5 (242)					220 (91)
	3X4-8	A70	3	4	11 (280)					220 (100)
	3X4-8G	A70	3	4						
	1X2-10	A05	1	2	8.5 (216)					200 (91)
	1½X3-10	A50	1½	3						220 (100)
	2X3-10	A60	2	3	9.5 (242)					230 (104)
	3X4-10	A70	3	4	11 (280)					265 (120)
	3X4-10H	A40	3	4	12.5 (318)	19.5 (495)	4 (102)	10 (254)		275 (125)
	4X6-10G	A80	4	6	13.5 (343)					305 (138)
	4X6-10H	A80	4	6						
	1½X3-13	A20	1½	3	10.5 (267)					245 (111)
	2X3-13	A30	2	3	11.5 (292)					275 (125)
	3X4-13	A40	3	4	12.5 (318)					330 (150)
	4X6-13	A80	4	6	13.5 (343)					405 (184)
XLTi/i-17	6X8-13	A90	6	8	16 (406)	27.875 (708)	6 (152)	14.5 (368)	5.25 (133)	560 (254)
	8X10-13	A100	8	10	18 (457)					670 (304)
	6X8-15	A110	6	8						610 (277)
	6X8-15N	A110	6	8						610 (277)
	8X10-15	A120	8	10	19 (483)					740 (336)
	8X10-15G	A120	8	10						710 (322)
	8X10-16H	A120	8	10						850 (385)
	4X6-17	A105	4	6	16 (406)					650 (295)
	3x4-17	—	3	4	16 (406)					457 (207)
	6X8-17	A110	6	8	18 (457)					730 (331)
	8X10-17	A120	8	10	19 (483)					830 (376)

All dimensions in inches and (mm). Not to be used for construction.

Construction Details

		STi	MTi	LTi	XLTi / i-17
Shaft	Diameter at Impeller	.75 (19)	1 (25)	1.25 (32)	1.5 (38)
	Diameter in Stuffing Box/Seal Chamber (Less Sleeve) (With Sleeve)	 1.375 (35) 1.125 (29)	 1.75 (45) 1.5 (38)	 2.125 (54) 1.875 (48)	 2.5 (64) 2 (51)*
	Diameter Between Bearings	1.5 (38)	2.125 (54)	2.5 (64)	3.125 (79)
	Diameter at Coupling	.875 (22)	1.125 (29)	1.875 (48)	2.375 (60)
	Overhang	6.125 (156)	8.375 (213)	8.375 (213)	9.969 (253)
	Maximum Shaft Deflection	0.002 (0.05)			
	Shaft Deflection Index (L^3/D^4) (With Sleeve) (Less Sleeve)	 143 64	 116 63	 48 29	 62 25
Sleeve	O.D. thru Stuffing Box/Seal Chamber	1.375 (35)	1.75 (45)	2.125 (54)	2.5 (64)*
Bearings	Radial	6207	6309	6311	6313
	Thrust	3306	3309	7310	3313
	Bearing Span	4.125 (105)	6.75 (171)	6.875 (164)	9.25 (235)
BigBore™ Seal Chamber	Bore	2.875 (73)	3.5 (89)	3.875 (98)	4.75 (120)*
Stuffing Box	Bore	2 (51)	2.5 (64)	2.875 (73)	3.375 (86)*
Power Limits	HP (kW) per 100 RPM	1.1 (.82)	3.4 (2.6)	5.6 (4.2)	14 (10.5)**
Temperature	Maximum Liquid Temperature – Oil/Grease Lubrication without Cooling	350°F (177°C)			
	Maximum Liquid Temperature – Oil Lubrication with High Temp. Option	700°F (370°C)			
Casing	Corrosion Allowance	.125 (3)			

* 17 inch sizes have 2¼ inch (57) shaft diameters in stuffing box/seal chamber with sleeve. Shaft sleeve O.D. is 2¾ inches (70) for packing and 2½ inches (64) for mechanical seals. Seal chamber bore is 4¾ inches (121). Stuffing box bore is 3⅝ inches (92).

** 17 inch sizes power limit per 100 RPM is 20 HP (15kW).

Process Industry Practices (PIP) Compliance

The standard design features of Goulds 3196 (ANSI B73.1M) and 3996 (ANSI B73.2M) pumps meet ASME/ANSI standards. In addition, both models can be manufactured to comply with PIP Specifications for application of horizontal and vertical in-line ANSI process pumps.

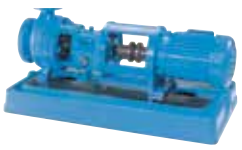


Model 3196 meets B73.1M and RESP73H



Model 3996 meets B73.2M and RESP73V

Other Features For Safety & Reliability



C-FACE ADAPTER

i-FRAME power ends accommodate optional C-face motor adapter – simplifies pump/motor alignment.



CENTERLINES-MOUNTED CASING

For high temperature services (500˚ to 700˚ F/260˚ to 370˚C).



ANSI COUPLING GUARD

Meets all requirements of ANSI B15.1 specifications.

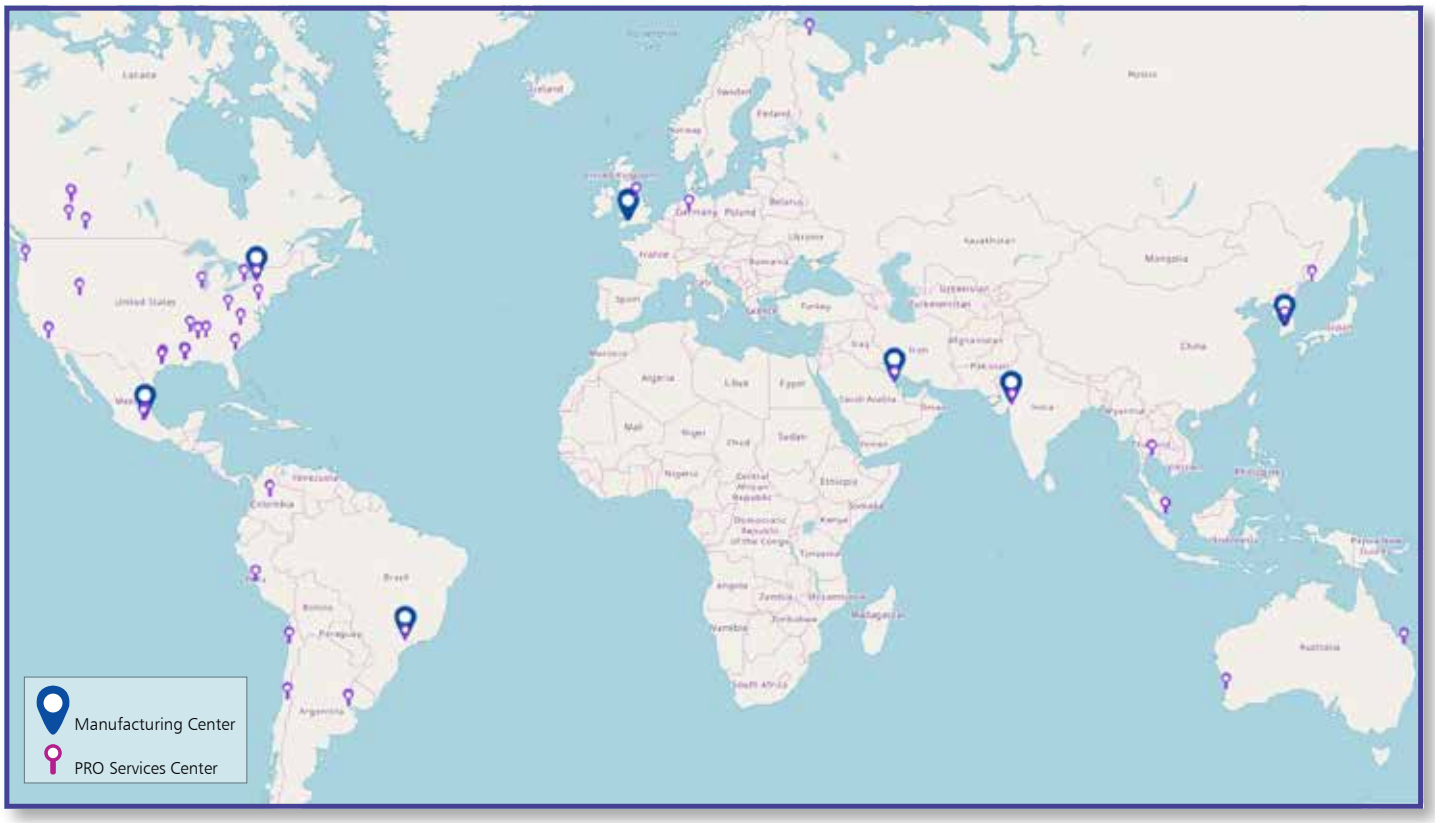


SHAFT GUARD

When a guard around all rotating shaft parts is required.

Notes

Locations



For more information Please Visit:
www.gouldspumps.com | www.ittproservices.com

GOULDS PUMPS
An ITT Brand

240 Fall Street
Seneca Falls, NY 13148
Phone: 315.568.2811
Fax: 315.568.2418
www.gouldspumps.com

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B.3196i-FRAME.en-US.2022-01

Appendix F

Hydropneumatic Tank

Pulsco

PULSCO

pulsco.com | 949.261.1717 | sales@pulsco.com

Horizontal Tanks for Air-Over-Water Systems

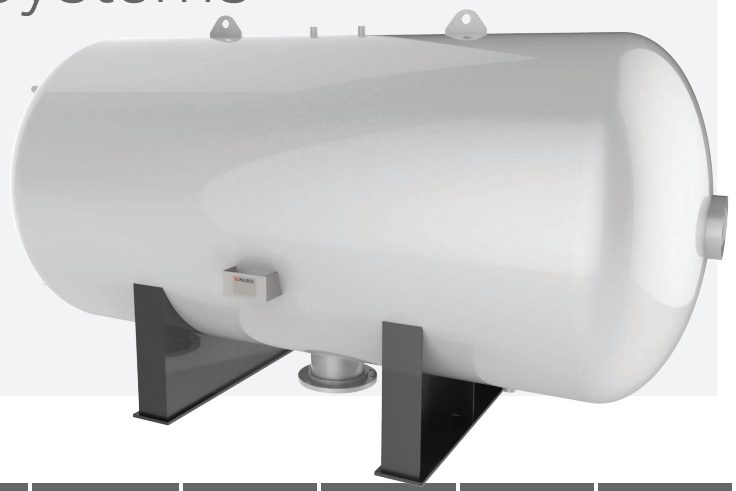
1,000 - 15,000 Gallons
150 psi & 250 psi

PULSCO's Horizontal Air-Over-Water System offers an effective solution for pressure and surge control applications. When paired with PULSCO's Skypark Controller and instrumentation, these systems are used to protect valuable assets along the pipeline.

All tanks are built to order in compliance with ASME BPVC VIII Div 1, with options for API & CRN. Ladders and platforms are available upon request.

The CT is designed for ease of operation and maintenance, with the highest standards of quality and performance.

PULSCO offers assistance with tank size selection for the given application. Completely customizable solutions are also available.



STANDARD SIZES - FIT TO SYSTEM

Select a model number using the table to the right.

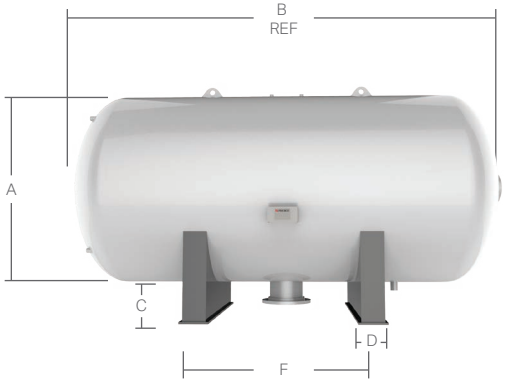
1. Select Volume
2. Select 150 psi or 250 psi
3. Select Model Number

   Add the selected pressure (150 psi or 250 psi) to the end of the Model Number.

   Ex. For a selection of 250 psi, the Model Number is CT-48-1000-250

Model Number	Volume		Dry Weight 150 psi		Dry Weight 250 psi		Outside Diameter A	Overall Length B	Bottom Clearance* C	Baseplate Width D	Baseplate Length E	Saddle Spacing F	Overall Height G
	Gallons	Liters	Pounds	Kilograms	Pounds	Kilograms	Inches	Inches	Inches	Inches	Inches	Inches	Inches
CT-48-1000	1,000	3,785	2,700	1,230	4,050	1,845	48	147	12	8	44	96	66
CT-60-1000	1,000	3,785	3,000	1,400	4,500	2,100	60	105	12	8	54	48	78
CT-54-1500	1,500	5,778	4,000	1,800	6,000	2,700	54	174	12	8	48	96	72
CT-66-1500	1,500	5,778	4,200	1,900	6,300	2,850	66	120	12	8	60	54	84
CT-60-2000	2,000	7,570	5,200	2,400	7,800	3,600	60	177	12	10	54	96	78
CT-72-2000	2,000	7,570	5,500	2,500	8,250	3,750	72	135	12	10	66	66	90
CT-72-2500	2,500	9,463	6,600	3,000	9,900	4,500	72	159	12	10	66	90	90
CT-78-3000	3,000	11,355	7,500	3,400	11,250	5,100	78	162	12	10	72	84	96
CT-72-4000	4,000	15,140	8,300	3,800	12,450	5,700	72	255	12	12	66	180	90
CT-84-4000	4,000	15,140	8,500	3,900	12,750	5,850	84	189	18	12	76	108	108
CT-72-4500	4,500	17,033	8,800	4,000	13,200	6,000	72	279	18	12	66	204	96
CT-84-4500	4,500	17,033	9,200	4,200	13,800	6,300	84	213	18	12	76	132	108
CT-84-5000	5,000	18,925	10,000	4,500	15,000	6,750	84	237	18	12	76	156	108
CT-96-7500	7,500	28,388	14,000	6,400	21,000	9,600	96	267	18	14	86	180	120
CT-108-10000	10,000	37,850	18,000	8,200	27,000	12,300	108	297	18	14	96	192	132
CT-120-15000	15,000	56,775	25,000	11,400	37,500	17,100	120	351	18	16	108	228	144

*Clearance dimension is adjustable
All values to be used as reference





	Included	Available Options
Manway	14 x 18 Elliptical	18, 24, or 30 Inches
MAWP	150 psi or 250 psi	--
Connection Size	Up to 24 in. 150 lbs. Max	--
Connection Orientation	Bottom	Side or Recirculating
Interior Paint System	Epoxy	NSF61
Exterior Paint System	Epoxy Primer Urethane Finish (Top Coat)	Zinc Primer (Optional for Coastal)
Color	Tan or Blue	Select from color chart

Appendix F

Hydropneumatic Pressure Control System

Pulsco

hydropneumatic control system

pressure



The PULSCO **ADVANTAGE**

PULSCO Pressure Control Systems are a control and feedback application that maintains water system pressure between a specified pressure range to prevent system pumps from cycling off and on too often.

The **PULSCO CPT-740** line automatically controls the tank pressure by utilizing an automatic pressure control system comprised of a control panel, pressure transmitter, level transmitter, and an air compressor. This product line requires minimum human interaction while maintaining relatively small energy cost which ultimately guarantees reliability of operation for systems regardless of tank sizes.

With the capability to design and supply complete systems, **PULSCO** can become your trusted source for specifications, system design and drawings designed to meet any specific performance requirements for any fluid and environment condition.