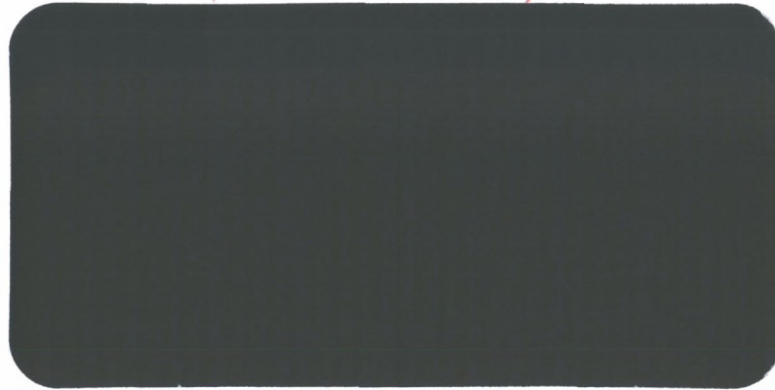


Preliminary

 **FILE COPY**



Accepted w/Comment

City of Scottsdale
Water Resources Administration
9379 E. San Salvador
Scottsdale, AZ 85258

This does not represent the
current operational concept

Doug Mann 6.5.2015

Doug Mann 12.10.15

Accepted w/Comment for
PPCASK

Doug Mann 12.11.15

3-PP-2015
6/22/2015

WOOD/PATEL
MISSION: CLIENT SERVICE™

**BASIS OF DESIGN REPORT
FOR
SCOTTSDALE NATIONAL GOLF CLUB
SEWAGE LIFT STATION #47
SCOTTSDALE, ARIZONA**

June 5, 2015

WP# 144147

Prepared for:

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TABLE OF CONTENTS

1.0	INTRODUCTION.....	3
1.1	Purpose and Scope of Design Concept Report.....	3
1.2	Background	3
2.0	EXISTING CONDITIONS.....	4
2.1	Topographic Conditions	4
2.2	Existing Offsite Wastewater Infrastructure	4
2.3	Existing Onsite Wastewater Infrastructure.....	5
3.0	WASTEWATER DESIGN CRITERIA AND DESIGN FLOWS.....	6
3.1	Design Criteria	6
3.2	Wastewater Design Flows	6
4.0	PROPOSED SLS #47 STATION AND FORCE MAINS	8
4.1	SLS #47 Site.....	8
4.2	Force Main	8
4.3	Force Main Design Scenarios.....	9
4.4	Wastewater Pumps	10
4.5	Gravity Sewer at Force Main Discharge	11
4.6	Wet Wells and Emergency Overflow Vault.....	12
4.7	Odor Control.....	12
4.8	Site Grading and Drainage	13
5.0	ELECTRICAL SYSTEMS.....	14
6.0	CONTROL SYSTEMS.....	16
6.1	Overview	16
6.2	Pump Station	16
6.3	Odor Control.....	16
6.4	Remote Telemetry Unit (RTU)	16
7.0	CONCLUSIONS.....	18

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APPENDICES

APPENDIX A

Calculations

APPENDIX B

WaterCAD Model

APPENDIX C

Selected Equipment:

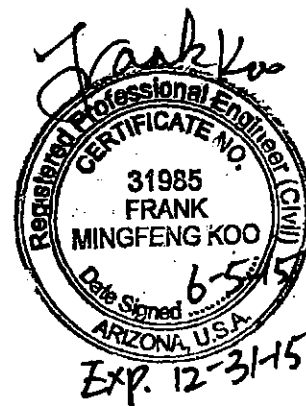
- Pump and Force Main System Curves
- Submersible Pumps & Appurtenances
- Valves
- Odor Control Systems
- Electrical and Controls

TABLES

TABLE 1	Wastewater Collection System Design Criteria	(Appendix A)
TABLE 2	Dynamite Road Gravity Sewer Capacity	(Appendix A)
TABLE 3	Offsite Wastewater Design Flows	(Appendix A)
TALBE 4	Onsite Wastewater Design Flows	(Appendix A)
TABLE 5	Pump and Forcemain Modeling Scenarios	(Appendix A)

FIGURES

FIGURE 1	Vicinity Map and Service Area
FIGURE 2	Dynamite Road Gravity Sewer Survey
FIGURE 3	SNGC Sewage Lift Station #47 Wastewater System



1.0 INTRODUCTION

1.1 Purpose and Scope of Design Concept Report

This Design Concept Report presents a preliminary design of the proposed Sewage Lift Station #47 (SLS #47) to the City of Scottsdale (City) for review and comment. The SLS #47 will be owned and operated by the City, and will be designed and constructed in accordance with City standards.

1.2 Background

Sewer Lift Station #47 was previously designed for Sierra Reserve by Wood/Patel and Associates. A Design Concept Report (DCR) and final engineering plan for the lift station as well as the force main was approved by City of Scottsdale in June 2013. Since then, the property became part of the Scottsdale National Golf Club (SNGC). The SNGC is 367.6 acres within the City of Scottsdale, located between Rio Verde Drive (Dynamite Road) on the south and Dixileta Road on the north, west of 122nd Street, and east of 116th Street (*Figure 1- Vicinity Map*).

The property will be an extension of the previously-developed Scottsdale National Golf Club, and is located within Section 26 and 27, Township 5 North, Range 5 East, of the Gila and Salt River Meridian. In total with the existing golf course, the property will include 658.5 acres. The SNGC is planned to include an 18-hole golf course, 9-hole golf course, clubhouse, comfort stations, maintenance building, cottages, and six private residences. The previously planned residential development in Sierra Reserve will be replaced with the new golf course oriented development.

2.0 EXISTING CONDITIONS

2.1 Topographic Conditions

With the exception of the minimal roadway rough grading and utility work performed in 2006, the site consists primarily of undeveloped native desert with typical Sonoran Desert vegetation, although 80% of the site was burned in the 1995 Rio Fire, destroying most of the vegetation at the time. The land generally slopes in a southeasterly direction at approximately 2 to 2.5 percent. The peak elevation within the site is approximately 2,770 feet above mean sea level (MSL), located near the intersection of Dixileta Drive and 118th Street. The lowest elevation within the Site is approximately 2,645 feet MSL, located near the intersection of 122nd Street and Dynamite Boulevard/Rio Verde Drive.

2.2 Existing Offsite Wastewater Infrastructure

Relevant public wastewater collection systems near to the site include the following:

- An existing 8-inch gravity sewer located along Dynamite Boulevard /Rio Verde Drive between 114th Street and Alma School Road.
- Water Campus Water Reclamation Plant located near the intersection of the AZ Loop 101 and Pima Road.

Additionally, a private wastewater system exists for the existing clubhouse. The system consists of an 8-inch gravity line and dual 2-inch force mains. The line extends from the existing clubhouse, along Via Dona Road, to the 122nd Street alignment. Currently, this private sewer utilizes an onsite septic system and is a dry sewer line; however, it is anticipated that with the construction of Lift Station #47, this line will be used to service the existing clubhouse and existing maintenance building.

According to City's 2012 Water Reuse Masterplan Update, wastewater generated on the Site will be treated at the Water Campus Water Reclamation Plant (WCWRP), located near Pima Road and AZ Loop 101. The WCWRP is the primary treatment facility for wastewater generated in the northern portions of the City of Scottsdale.

According to the City of Scottsdale Water Resources Department, downstream capacity

for the SLS #47 discharge is dependent upon the capacity in the existing 8-inch gravity sewer line in Dynamite Boulevard between 114th Street and Alma School Road. At the request of the City of Scottsdale Water Resources Department, Wood/Patel surveyed ten (10) existing manholes along the approximate 2,475 linear foot stretch of existing sewer line. The survey information was used to calculate as-built pipe slopes. The calculated pipe slopes were then analyzed using Manning's equation to obtain the sewer line capacity assuming a depth to diameter (d/D) ratio of 0.75. There are several existing and future residential lots, located along Dynamite Boulevard and adjacent to 114th Street, that are believed to be designated to drain to the segment of Dynamite sewer line. These flows were quantified and deducted from the 0.75 d/D capacity to determine the available capacity for SLS #47. The number of units was estimated from City quarter-section maps (51-54, 51-55, and 52-55), and the corresponding design flows were estimated using City of Scottsdale wastewater design flow criteria. The flows were then applied to the Dynamite sewer line at the manhole discharge locations displayed on the City quarter-section maps. Refer to Figure 2 – *Dynamite Sewer Line Survey* for surveyed inverts and calculated pipe slopes and capacities.

2.3 Existing Onsite Wastewater Infrastructure

A portion of the Site is mass graded, with native desert located along the western, northern, and southern boundaries of the Site. It is Wood/Patel's understanding there is no existing pressurized onsite wastewater infrastructure, except in accordance with The Reserve 51-Lot improvement plans, where the 8-inch gravity sewer lines from Lift Station #47 to 121st Street, then northerly to the western boundary of the existing Scottsdale National Golf Club, were installed. These lines are believed to be dry lines.

3.0 WASTEWATER DESIGN CRITERIA AND DESIGN FLOWS

3.1 Design Criteria

Wastewater design criteria used are based on Wood/Patel's understanding of design criteria in the *City of Scottsdale Design Standards and Policy Manual dated 2010* and regionally accepted design standards. The *Arizona Administrative Code (R18-9-E301.4)* was also followed to estimate the peak design flow and the design of the lift station and the force main. In addition, City of Scottsdale's "Sewer Lift Station Design Criteria", dated November 20, 2014 was followed for the design of the force main.

Refer to Table 1 - *Wastewater Collection System Design Criteria* in Appendix A for detailed information regarding design criteria.

3.2 Wastewater Design Flows

Wastewater design flows for the Scottsdale National Golf Course (SNGC) were estimated using design criteria listed in Section 3.1 – *Design Criteria*. The proposed comfort stations and potential residence will have individual septic systems. The proposed clubhouse and cottages will flow to Lift Station #47. The proposed maintenance facility will flow by gravity to a proposed gravity sewer in Rio Verde Drive which will be conveyed east to Lift Station #47. The existing maintenance facility and existing clubhouse, presently on septic will be connected to Lift Station #47. Wastewater design flows generated by the offsite and onsite areas are summarized as follows:

SNGC Offsite Flows	
Type	Average Daily Flow (gpd)
Existing SNGC Clubhouse	8,250
Existing SNGC Maintenance	3,750
OFF7 (R1-190)	4,356
OFF8 (R1-130)	3,267
TOTAL	19,623

SNGC Onsite Flows	
Type	Average Daily Flow (gpd)
Proposed Clubhouse	27,500
Proposed Cottages	27,360
Proposed Maintenance	3,750
Private Residence	1,500
Comfort Stations	4,750
TOTAL	64,860

Detailed design flow calculations are provided in Table 3 – *Offsite Wastewater Flows* and Table 4 – *Onsite Wastewater Design Flows* in Appendix A. For the layout of the proposed wastewater collection system, refer to Figure 3 – *Wastewater Exhibit - Full Build-Out*.

Modeled Wastewater Flows

Avg. Day, Full Build-out:	84,483 gpd (58.7 gpm)
Equivalent Population (based on 100 GPD/capita):	845
Peaking Factor:	2.46 (using a population of 800)
Peak Dry Weather Flow, Full Buildout:	144.4 gpm (use 145 gpm)
Peak Flow with 35 gpm pool drainage:	179.4 gpm (use 180 gpm)

Modeled Wastewater Flows (Onsite Only-Phase 1)

Avg. Day, Onsite:	64,860 gpd (45.0 gpm)
Avg. Day, Existing Offsite:	12,000 gpd (8.3 gpm)
Total Avg. Day	76,860 gpd (53.4 gpm)
Equivalent Population (based on 100 GPD/capita):	769
Peaking Factor:	2.50 (using a population of 700)
Peak Dry Weather Flow, Full Buildout:	133.5 gpm
Peak Flow with 35 gpm pool drainage:	168.5 gpm

4.0 PROPOSED SLS #47 STATION AND FORCE MAINS

4.1 SLS #47 Site

The proposed SLS #47 will be located at the southeast corner of the property, near the intersection of 121st Street and Rio Verde Drive (Figure 1 -- *Vicinity Map and Service Area*).

The SLS #47 site (see Appendix D- *Sierra Reserve SLS #47 and Onsite Forcemain Improvement Plans*) is contained within a 60-foot by 60-foot area, as shown. A 20-foot public utility easement (PUE) will be located on the south side of the proposed site extending to the Rio Verde Drive right-of-way. Site information is provided below.

Site

Approximate Site Dimensions:	60 ft x 60 ft
Access:	16 ft wide driveway with sliding gate; walk-through door
Grading & Drainage:	No on-site retention; decomposed granite surface.

4.2 Force Main

Based on force main velocities and anticipated dynamic head losses, two 4-inch ductile iron pipe force mains are recommended to convey the wastewater flows from the SLS #47 south to a proposed valve vault. The forcemains will combine with proposed dual 4-inch forcemains from Reata Ranch and transition into one 6-inch forcemain and one 4-inch forcemain (see Table 5 – *Pump and Forcemain Modeling Scenarios*). The 4-inch force main will be designed to convey flows for the initial Phase and the 6-inch line will support the full-buildout conditions. It is expected that only one 4-inch main will be utilized at a time during the first phase of the project. When the SLS #47 is upgraded for the second phase, both force mains may be used simultaneously.

The proposed force mains will extend west along Rio Verde Drive, and terminate at a new gravity manhole located at the high elevation point in the Rio Verde Drive alignment near 116th Street, where gravity flow will continue west to a point west of the 112th Street alignment then discharge to an existing manhole.

4.3 Force Main Design Scenarios

Several scenarios were modeled using WaterCAD software for the pump phasing. Seven scenarios are considered for various operating conditions. The detailed descriptions of these scenarios are explained below. A summary of the scenario results is listed in Table 5 - *Pump and Force Main Modeling Scenarios* in Appendix A.

1. The first scenario assumes SNGC SLS #47 is in service. Only the onsite flows contribute to the pump station. One pump can convey 147 gpm through one 4-inch force main. The 4-inch common force main is used for the SNGC flow and the 6-inch forcemain is closed. Velocity through the 4-inch pipe is 3.37 ft/s. Wastewater entering SLS #47 greater than the pump rate is contained in the retention vault next to the wet well.
2. The second scenario represents the full buildout of SNGC flows and the Phase 1 flows from Reata Ranch. In this case, the 6-inch forcemain is opened and the 4-inch common force main is closed. The total flow through the 6-inch force main is 300 gpm at a velocity of 3.40 ft/s.
3. After the 6-inch line is in operation, there will be times when only the pump station from Reata Ranch or from SNGC will be running. This scenario shows the flow and velocity assuming SNGC SLS #47 is pumping flows while the Reata Ranch pumps are off. The velocity of the 6-inch force main in this condition is 2.04 ft/s.
4. This scenario models the full buildout from SNGC and Reata Ranch. The total flow of 420 gpm is split between the 4-inch and 6-inch common force main. 119 gpm enters into the 4-inch line at a velocity of 2.74 ft/s and 301 gpm enters the 6-inch line at a velocity of 3.41 ft/s.
5. There will be occasions when only one pumping station is operating, so this scenario models the flow from SNGC when both the 4-inch and 6-inch common force mains are open. The 4-inch line conveys 51 gpm at a velocity of 1.17 ft/s,

and the 6-inch line conveys 129 gpm at a velocity of 1.46 ft/s.

6. This scenario models an emergency repair of the 6-inch combined force main that involves closure of the force main for 6 hours. The 4-inch combined force main is opened. The SNGC pumps are set to flow 50 gpm during this time through 1-4 inch force main at a velocity of 1.16 ft/s. Additional 140 gpm flow from the Reata Ranch pump station enters the 4-inch combined force main. The total flow at the 4-inch combined force main is 190 gpm at a velocity of 4.36 ft/s. Wastewater entering the pump stations greater than the pump rate is contained in a retention vault next to the wet well at each site.
7. A model of a repair of the 4-inch combined force main involves closure of the force main for 6 hours. The 6-inch combined force main is open. The SNGC pumps are set to pump a maximum of 110 gpm during this time through 1-4 inch force main at a velocity of 2.52 ft/s. One Reata Ranch lift station pump can pump as much as 114 gpm in this scenario. Two pumps increase the flow to 228 gpm. The total flow at the 6-inch combined force main is 338 gpm at a velocity of 3.84 ft/s. Wastewater entering the pump stations greater than the pump rate is contained in a retention vault next to the wet well at each site.

4.4 Wastewater Pumps

The proposed pumps are sized to accommodate the estimated peak flows from the service areas, including swimming pool drainage as discussed in Section 4.1. The following table shows the summary of the pumps selected:

Peak Dry Weather Flow + Swim Pool Drainage:	180 gpm
Pump Design Point (each pump):	179 gpm @ 113 ft. TDH
No. of Pumps:	2 (Duplex)
Pump Manufacturer:	FLYGT
Pump Model:	NP 3127 SH
Impeller size:	6-1/8 in.
Pump Capacity:	179 gpm @ 113 ft. (Ea. Pump)

Minimum flow:	100 gpm
Motor Size:	11 HP
Pump Type:	Submersible Non-Clog
Pump Motor Speed Control:	Variable Speed Drive
Pump Controls:	Ultrasonic Sensor (Primary); float Switches (Backup)
Pumping Sequence:	Lead / Lag; All Pumps On at High- High alarm Level
Voltage / Phase / Freq:	460 V / 3 PH / 60HZ
Motor Speed:	3495 rpm

4.5 Gravity Sewer at Force Main Discharge

Pump flow discharge from SLS #47 and the Reata Ranch pumping station to a gravity sewer on Rio Verde Drive and 116th Street is estimated to be a peak of 420 gpm. Gravity flow will continue to a point west of the 112th Street alignment to an existing manhole. The existing 8-inch sewer line has a capacity constraint in a portion of the sewer between 112th Street and Alma School Road. A capacity analysis was performed on the sewer line and a summary of the section with a capacity constraint is shown in the following table. Reference Figure 2 – *Dynamite Sewer Line Survey* for surveyed inverts and calculated pipe slopes and capacities. As shown in the table, if SNGC and the Reata Ranch discharge to manhole F, the total flow will be 510 gpm, which exceeds the capacity of the sewer line.

Critical segment slope (Manhole E to Manhole F)	0.0051 ft/ft
Capacity @ d/D = 0.75	353 gpm
Estimated flow from tributary areas at full build-out	90 gpm
Estimated flow from Sierra Reserve & Reata Ranch	420 gpm

To avoid the critical segment of gravity sewer between Manhole E and Manhole F, the proposed SLS #47 will pump sewage flows from SNGC via force main and gravity sewer along Rio Verde Drive, past the critical segment, and will outfall to Manhole G located near BPS #100

The gravity-sewer segments downstream of the force main discharge manhole were

analyzed using the additional flow rate from the force main. These analyses (see Table 2 and Figure 2 – *Dynamite Road Gravity Sewer Survey*) indicate that the existing downstream gravity sewer can accommodate flows from Scottsdale National Golf Club and Reata Ranch subdivisions of 420 gpm. These analyses include estimated future flows from adjacent tributary areas.

4.6 Wet Wells and Emergency Overflow Vault

The proposed wet well is designed to provide 10 minutes between pump cycles during peak flow conditions when the pumps alternate operation. The proposed SLS #47 location is at the southeast corner on SNGC development. Due to wash crossings in the area, the gravity sewer enters into the wet well at a depth of 21-feet. An emergency underground wastewater detention vault will be provided near the wet well to store excess wastewater flows in the event of a failure scenario not to exceed 6 hours. This vault will be linked to the wet well by an overflow pipe that will allow wastewater to flow from the wet well into the vault. In the event of a force main failure, one 4-inch force main will remain in operation and will be able to convey up to 100 gallons per minute (gpm) from the SLS #47. Six hours of retention time is provided during a peak flow scenario. The entire volume of each structure as well as the surcharged collection system was used in determining storage. See Appendix A – *Calculations* for additional information.

Wet Well

Type:	Precast Concrete
Diameter:	7 feet
Depth:	26 feet
Coating:	Raven 405 Epoxy Coating
Retention Volume:	6,160 gallons

Retention Vault

Type:	Precast
Diameter:	7 feet
Depth:	22.3 feet
Coating:	Raven 405 Epoxy Coating
Retention Volume:	6,419 gallons

4.7 Odor Control

A biofilter odor control process, in accordance with City requirements, is proposed near the force main discharge manhole. To minimize hydrogen sulfide formation and odors within the force main, a chemical-feed system with mixer is proposed that will inject a ferric chloride solution into the wet well when the pumps are running. It is estimated that 8 gal/day of ferric chloride solution will be required at full build out. With 540 gallons storage, this will provide 67 days storage at full build out. See below for proposed equipment information. Equipment data sheets can be found in Appendix C.

Odor Control (Force Main Discharge)

Type:	Biofilter
Manufacturer:	Bohn Biofilter

Odor Control (Force Main)

Type:	Chemical Feed
Manufacturer:	Core-Rosion Products
Chemical:	ferric chloride
Storage Tank Volume:	540 gallons
Dose Rate:	63 ml/min.
Chemical Storage provided (full buildout):	67 days

4.8 Site Grading and Drainage

The proposed site generally slopes to the southwest. Drain blocks will be installed along the south wall at designated locations to allow runoff to leave the site. No on-site retention is proposed. A 6-inch layer of aggregate base course (ABC) or decomposed granite is proposed over compacted native soil within the site.

5.0 ELECTRICAL SYSTEMS

5.1 Power Distribution

The design will include the installation of two (2) 11-HP pumps at SLS #47. The pump station will have electrical service provided by APS via utility owned and maintained pad mounted transformers. The electrical service at the pump station will be 200-Amp, 277/480-Volt, 3-Phase, 4-Wire. Refer to *Load Calculation* in Table 3. The force main odor scrubber service will be a 100-Amp, 120/240-Volt, 1-Phase, 3-Wire system. The odor scrubber service will have minimal loads including a 0.5-HP blower, Remote Telemetry Unit (RTU), and miscellaneous equipment.

Preliminary Electrical Load Calculation

Circuit/Description	Kva	Hp	Fla
Motor Loads			
Wastewater Pump (Pmp-101)		25.0	52.0
Wastewater Pump (Pmp-102)		25.0	52.0
Non-Motor Loads			
Mini Power Zone (Mpz-100)	15.0		18.0
			0.0
Subtotal			122.0
+ 25% Of Largest Motor			13.0
Total Amps @ 480v/3phase			135.0
Service Size (Amps)			200.0

The SLS #47 service will feed a 200-Amp Distribution Panel (DP) through an Automatic Transfer Switch (ATS). The Distribution Panel will supply both normal and standby 480-Volt power to the entire SLS #47, including the wastewater pumps and mini power zone. Standby power for the pump station will be provided by an on-site natural gas engine-driven standby generator. The generator will have a weatherproof and sound attenuating enclosure.

All 120/208-volt circuits will be supplied by a 15-KVA mini power zone (MPZ-100).

MPZ-100 will provide power for the Remote Telemetry Unit (RTU), site lighting, generator block heater and battery charger, odor control equipment, convenience receptacles, and miscellaneous devices.

5.2 Lighting

Pole-mounted and/or wall-mounted luminaires will be provided for security and task lighting. Area lighting will be controlled by a switch placed at the pedestrian gate entrance to the site.

6.0 CONTROL SYSTEMS

6.1 Overview

The SLS #47 and odor control system comprise automatic controls, manual controls, and system monitoring. The wastewater pumps will be monitored and controlled through a pump control panel and site remote telemetry unit (RTU). The offsite odor control system will have its own RTU for monitoring only. The RTU's at all sites will monitor system parameters including: power metering, intrusion (into the wet well, vaults, and electrical gear), RTU high temperature, wastewater pump status, wet well high and low level alarms, wet well high and low level alarms, generator status, ATS status, and odor control system status.

6.2 Pump Station

SLS #47 will contain a full voltage not-reversing motor starter for control. The pumps can be started and stopped using the Hand/Off/Auto (HOA) at the pump control panel or automatically with the RTU or backup pressure switches. In manual mode, the pumps will be controlled by placing the HOA in Hand mode. In Auto mode, the wastewater pumps are controlled by the RTU or backup pressure switches. Automatic control by the RTU will be bypassed automatically upon detection of the wet well at high-high alarm level. The RTU utilizes the following instruments to control and monitor the wastewater pumps: magnetic flow meter, wet well level float switches (low-low alarm, low level stop, high level start, and high-high alarm), motor high temperature/leak detectors, and the wet well submersible level transmitter.

6.3 Odor Control

The biofilter odor control system is comprised of a system blower, irrigation system, and biofilter media. The irrigation system will be provided with a control panel from the manufacturer. The system blower will be provided with a control panel that will be monitored by the RTU for system parameters including blower run status, blower overload condition and vault flooded.

6.4 Remote Telemetry Unit (RTU)

The RTU at each site will include a Bristol Babcock, Control Wave process automation

controller for system monitoring and control. Digital inputs will be 24 VDC non-isolated. Digital outputs will incorporate 24 VDC interposing relays for 120 VAC system controls. Analog inputs will be 4-20mA. 20% spare I/O will be provided for future use. Redundant 24 VDC power supplies will be provided for RTU power. An uninterruptible power supply (UPS) will be provided for backup during short term power outages.

Communication from the site to the City of Scottsdale Water Operations SCADA system will be via a radio modem using a licensed 928 MHz frequency. A radio survey will be provided by the City of Scottsdale to determine the required orientation and mounting height of the Yagi antennas. If required by the City, there will be two (2) radio systems provided for the pump station. One of these will be used for communication to the City's SCADA system and the other for communication between pump stations and/or offsite odor control station.

7.0 CONCLUSIONS

Based on the analysis of the proposed service area, and the design of the SLS #47 and force main, the following conclusions can be made:

1. The wastewater design flows and system criteria are consistent Wood/Patel's understanding of requirements and standards listed in Title 18, Chapter 9 of the *Arizona Administrative Code* and the *City of Scottsdale's Design Standards and Policy Manual – 2010*.
2. The proposed SLS #47 and force mains will be designed to provide wastewater service to the proposed golf course and the offsite areas.
3. The proposed force mains are designed to accommodate flows from a future pumping station at Reata Ranch (by others), based on the assumptions stated in this report. The full build-out wastewater flow rates modeled in this report may or may not be achieved.
4. The design and construction of the following may be required by others for the SLS #47 to serve areas beyond Sierra Reserve development:
 - Additional force main connections to the proposed force main valve vault in Rio Verde Drive.

APPENDIX A

Calculations

Project: Scottsdale National Golf Course
Location: Scottsdale, AZ
Date: May 20, 2015
References: 2010 City of Scottsdale Design Standards & Policies Manual and AAC Title 18, Chapter 19

Proj. Number: 144147
 Proj. Engineer: FMK

UNIT DAILY RESIDENTIAL WASTEWATER FLOWS

Description	Value	Units	Note(s)
Residential			
Average Day Wastewater Flow per Person (Pipes with 8 to 12 inch diameters)	100	GPD/person	1
Population Density	2.5	persons/du	1
Average Day Wastewater Flow per Dwelling Unit (Pipes with 8 to 12 inch diameters)	250	GPD/du	1
Average Day Wastewater Design Flows, Resort Units			
Cottages	380	GPD/room	1
Comfort Stations	950	GPD/Comfort Station	2
Country Club Amenities (Resident Member)	100	GPD/Resident Member	3
Country Club Amenities (Nonresident Member)	10	GPD/Nonresident Member	3
Office (Used to model the existing Maintenance building)	0.5	GPD/SQ FT	1

Notes:

1. Per City of Scottsdale Design Standards & Policies Manual
2. Previous Comfort Stations planned within the Scottsdale National Golf Course accounted for a wastewater demand design flow of 950 GPD. This wastewater demand was calculated from the following assumptions: 3 Toilets*(200 GPD/Toilet) + 2 Urinals*(100 GPD/Urinal) + 4 Sinks*(25 GPD/Sink) + 1 Ice Machine*(25 GPD/Ice Machine) + 1 Janitor Utility Sink*(25 GPD/Janitor Utility Sink)= 950 GPD.
3. Per Table 1- Unit Design Flows from the Arizona Administrative Code, Title 18, Chapter 9
4. Peaking Factor = 2.46 (population=800)

WOOD/PATEL

TABLE 2. Dynamite Sewer Capacity Check (Alma School to 114th Street)

CIVIL ENGINEERS • HYDROLOGISTS • LAND SURVEYORS • CONSTRUCTION MANAGERS

Project: Scottsdale National Golf Club
 Location: Scottsdale, AZ
 Date: May 22, 2015
 References: City of Scottsdale Design Standards Manual

144147

Proj. Engineer: Ken Knickerbocker

UPSTREAM NODE	DOWNSTREAM NODE	PIPE SIZE (IN)	CALCULATED SLOPE FROM WOOD/PATEL SURVEY (9/9/10)	OFFSITE LOTS BELIEVED TO BE DESIGNATED TO DRAIN TO THE DYNAMITE SEWERLINE (UNITS) ³	PEAK FLOW FROM EXISTING DEVELOPMENT UNITS (GPM) ²	PEAK FLOW FROM REATA RANCH PUMP STATION & THE SNGC SLS #47 (GPM) ¹	PEAK SEWER FLOW BY PIPE SEGMENT (GPM)	CUMULATIVE PEAK SEWER FLOW (GPM)	d/D RATIO IN PIPE	FLOW CAPACITY IN PIPE AT 0.75 d/D (GPM)
A	B	8	0.00580	53	37		37	37	0.64	376.64
B	C	8	0.00500	46	32		32	69	0.73	349.70
C	D	8	0.00500	10	7		7	76	0.75	349.70
D	E	8	0.00600	0	0		0	76	0.69	383.08
E	F	8	0.00510	21	15		15	90	0.77	353.18
F	G	8	0.01665	0	0		0	90	0.51	638.14
G	H	8	0.01640	0	0	420	420	510	0.70	633.33
H	I	8	0.01403	0	0		0	510	0.75	585.79
I	J	8	0.02470	0	0		0	510	0.61	777.25
Total				130	90	0	510	510		

Notes:

1. Peak flow includes estimated flow from Scottsdale National development.
2. Per City of Scottsdale 2010 DS&PM
3. Per City of Scottsdale 1/4 Section Maps 51-54, 51-55 and 52-55.

WOOD/PATEL
TABLE 3 -Offsite Wastewater Design Flows

Project: Scottsdale National Golf Course
Location: Scottsdale, Arizona

Proj. Number: 144147
Proj. Engineer: Ethan Boyle, P.E.

PRELIMINARY LAND USE AND DWELLING UNIT BREAKDOWN

Type	Non-Residential Acres	Population Density (persons/DU or Acre, patrons/day)		Commercial/Industrial/Retail S.F.	GPD/1000 SF	Land Use	Unit Daily Wastewater Demand (GPD/DU, AC, or S.F.)		Avg Day (GPD)	Total Avg Day (GPD)
Existing SNGC Clubhouse/Maintenance	0.60	150	Patrons/Day	26,284	-	Clubhouse	⁽¹⁾ 100 (Res.) 10 (Nonres.)	GPD/Person	8,250	12,000
	0.17	-	-	7,500	3.8	Maintenance Building	0.5	GPD/SQ FT	3,750	
OFF7	-	76	Acres	-	-	R1-190	250	GPD/DU	4,356	7,623
OFF8	-	39	Acres	-	-	R1-130	250	GPD/DU	3,267	
Offsite Totals	0.77			33,784						19,623

Notes:

1. Assumed 50% members are Resident and 50% members are Nonresident.

WOOD/PATEL

TABLE 4 -Onsite Wastewater Design Flows

Project: Scottsdale National Golf Club
Location: Scottsdale, Arizona

Proj. Number: 144147
Proj. Engineer: Ethan Boyle, P.E.

PRELIMINARY LAND USE AND DWELLING UNIT BREAKDOWN

Type	No. of Dus/Casitas/ Comfort Stations	Residential Acres	Non- Residential Acres	Population Density (persons/DU or Acre, patrons/day, person/DU)		Commercial/ Industrial/ Retail S.F.	GPD/1000 SF	Land Use	Unit Daily Water Demand (GPD/DU, AC, or S.F.)		Avg Day (GPD)	Total Avg Day (GPD)
Comfort Stations ⁽¹⁾	5	-	0.14	-	-	-	-	Comfort Station	950	GPD/Comfort Station	4,750	4,750
Future Clubhouse	-	-	2.87	500	Patrons/Day	34,200	-	Clubhouse	⁽³⁾ 100 (Res.) 10 (Nonres.)	GPD/Person	27,500	27,500
Future Maintenance Building ⁽¹⁾	-	-	0.17	-	-	7,500	3.8	Maintenance Building	0.5	GPD/SQ FT	3,750	3,750
Cottages	72	6.4	-	-	-	277,344	-	Resort with Ammenities	380	GPD/Room	27,360	27,360
Future North Residence ⁽²⁾	1	-	-	-	-	-	-	Residential	1,500	GPD/DU	1,500	1,500

Onsite Wastewater Flow to Septic Systems	0.14	6,250
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Onsite Wastewater Flow to Lift Station	6.4	3.04	319,044	58,610
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Total Onsite Wastewater Flow to Rio Verde Gravity Sewer	-	0.17	7,500	3,750
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Total Onsite Wastewater Flow	6.4	3.18	319,044	64,860
---------------------------------	-----	------	---------	--------

Notes: 1) Each comfort station and the maintenance building will have an individual septic system, therefore the wastewater flow will not be accounted for within the gravity sewer design portion of this report.

2) The estimated wastewater flow will be dependant on the final design of the future residence. This residence will also have an individual septic system, therefore the wastewater flow will not be accounted for within the gravity sewer design portion of this report.

3) Assumed 50% members will be Resident and 50% members will be Nonresident.

Table 5. Pump and Forcemain Modeling Scenarios

Scenario	SNGC SLS #47				Reata Ranch SLS #48				Combined Force mains			
	Pump Flow (gpm)	4-inch FM#1 (gpm)	4-inch FM#2 (gpm)	Velocity (ft/s)	Pump Flow (gpm)	4-inch FM#1 (gpm)	4-inch FM#2 (gpm)	Velocity (ft/s)	4-inch FM (gpm)	Velocity (ft/s)	6-inch FM (gpm)	Velocity (ft/s)
1 Onsite SNGC Only with 4" FM	147	73	73	1.73	closed	closed	closed	0	147	3.37	closed	0
2 SNGC + Reata Ranch Ph1 with 6" FM	180	180	closed	4.13	120	120	closed	2.75	closed	0	300	3.40
3 SNGC Buildout Only with 6" FM	180	180	closed	4.25	closed	closed	closed	0	closed	0	180	2.04
4 Full Buildout of SNGC & Reata Ranch	180	82	98	2.28	240	120	120	2.75	119	2.74	301	3.41
5 SNGC Buildout with 4" & 6" FM	180	90	90	2.12	closed	closed	closed	0	51	1.17	129	1.46
6 SNGC and Reata Ranch with 6" FM broken	50	50	closed	1.16	140	70	70	1.60	190	4.36	closed	0
7 SNGC and Reata Ranch with 4" FM broken	110	110	closed	2.52	228	114	114	2.62	closed	0	338	3.84

Project: SNGC SLS #47
 Location: Scottsdale, AZ
 Date: 5/21/15
 PUMP STATION #1
DIMENSIONS

Project Number: 144147
 Project Engineer: FMK

Description	Value	Units	Notes
Wet Well Diameter:	7.0	FT	
Wet Well Depth:	26.0	FT	Assumed depth.
Retention Vault Diameter:	8.0	FT	
Retention Vault Working Depth:	22.3	FT	

FLOW RATES

Description	Value	Units	Notes
Peak Daily Flow, Full Buildout:	259,200	GPD	Per Design Flows
Net Outflow, 1 Pump Running, Full Buildout:	180	GPM	Pumping Rate - PF

ELEVATIONS

Description	Value	Units	Notes
Wet Well Base Elevation:	2,629.5	FT	
Pumps 'Off' Level:	2,630.5	FT	
Pump 1 'On' Level (Full Buildout):	2,632.1	FT	Full-Buildout Setting.
Pump 2 'On' Level (Full Buildout):	2,633.1	FT	
Alarm Level (Full Buildout):	2,634.1	FT	
Gravity Sewer Inlet Elevation:	2,634.1	FT	Estimated 12 foot cover due to washes
Rim Elevation:	2,656.5	FT	4 foot 100yr depth +1ft
Finished Grade Elevation:	2,655.5	FT	Low point of site

PUMP CYCLE TIME

Description	Value	Units	Notes
Working Volume (Full Buildout):	461	GAL	$\text{PI} \times (\text{Dia}^2)/4 \times (\text{Pump On El} - \text{Pump Off El}) \times 7.48 \text{ gal/ft}^3$
Normal Wet Well Retention Time, Full Buildout:	5	MIN	$(\text{Working Vol} / \text{Net outflow}) + (\text{Working Vol} / \text{Peak Day Flow})$
Pump Cycle Time, Full Buildout:	10	MIN	$(\text{Work. Vol} / \text{Net Outflow} + \text{Work. Vol} / \text{Peak Daily Flow}) \times 2$ for lead/lag pump operation

PUMP-FAILURE RETENTION CALCULATIONS

Description	Value	Units	Notes
Wet Well Retention Vol:	6,160	GAL	$(\text{FG Elevation} - \text{Alarm Elev}) \times \text{PI} \times \text{Dia}^2/4 \times 7.48 \text{ gal/ft}^3$
Overflow Vault Retention Vol:	8,385	GAL	$\text{Vault pi} \times \text{D}^2/4 \times \text{L} \times \text{H} \times 7.48 \text{ gal/ft}^3$
Inside Diameter Gravity Sewer	8	IN	Gravity Sewer service line
Length of Gravity Sewer Below Rim Elev	1,800	FT	
Gravity Sewer Storage Vol	10,337	GAL	Surcharge Volume
Total Retention Vol:	24,882	GAL	Wet Well Retention Vol + Vault Retention Vol + Surcharge Vc
Required Retention Volume, Full Buildout:	23,608	GAL	Peak 6 hr volume - 1 pump running 60 gpm for 6 hours.
Retention Volume Provided:	24,882	GAL	Volume in wet well from alarm level to finished grade.
Required Retention Time:	6.0	HRS	Per City of Scottsdale
Retention Time Provided, Full Buildout:	6.3	HRS	Wet Well + Storage Vault

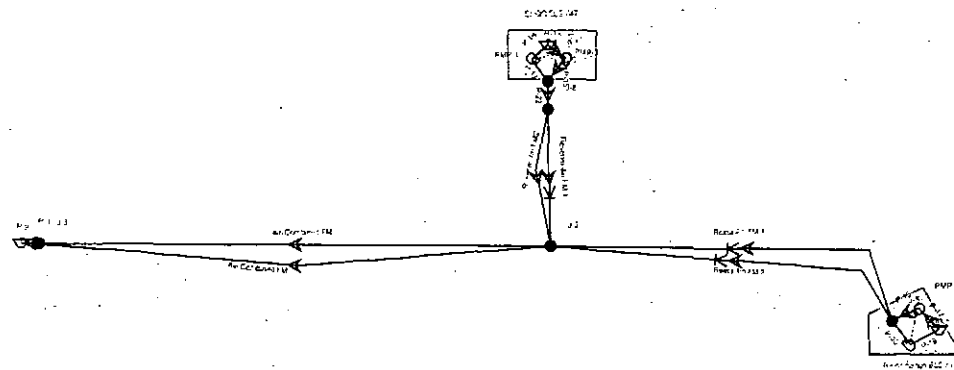
FORCE MAIN VOLUME AND TURNOVER

Description	Value	Units	Notes
Inside Diameter	4.2	IN	
Full Length of Force Main	3,522	FT	
FM Storage Vol	2,559	GAL	
Ave Day Volume Pumped	63,750	GAL	Initial = 1/2 Full Buildout
Force Main Turnover Rate	24.9	TIMES/DAY	
Full Length of Force Main	3,522	FT	using 1 6" FM during pumping station phase 2
FM Storage Vol	5,118	GAL	
Ave Day Volume Pumped	127,500	GAL	Initial = 1/2 Full Buildout
Force Main Turnover Rate	24.9	TIMES/DAY	

APPENDIX B

WaterCAD Model

Scottsdale Nation Golf Club
Active Scenario: 4. SNGC + Reata Ph2
Scenario: 4. SNGC + Reata Ph2



Scottsdale Nation Golf Club
Active Scenario: 1. SNGC - 4 inch FM Only
FlexTable: Pipe Table

Current Time: 0.000 hours

Label	Length (Scaled) (ft)	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)
SNGC 4in FM 1	69	4.16	Ductile Iron	130.0	73
4in Combined FM	262	4.22	PVC	130.0	147
Reata 4in FM 1	202	4.22	PVC	130.0	0
Reata 4in FM 2	190	4.22	PVC	130.0	0
SNGC 4in FM2	70	4.16	Ductile Iron	130.0	73
P-9	9	12.00	PVC	130.0	-147
P-12	15	6.00	PVC	130.0	0
P-13	15	6.00	PVC	130.0	0
P-14	11	12.00	PVC	130.0	147
P-15	15	4.16	Ductile Iron	130.0	147
P-16	11	12.00	PVC	130.0	0
P-17	14	4.16	Ductile Iron	130.0	0
P-19	17	6.00	PVC	130.0	0
P-20	15	6.00	PVC	130.0	0
6in Combined FM	263	6.00	PVC	130.0	0
P-22	14	4.16	Ductile Iron	130.0	147

Velocity (ft/s)	Headloss Gradient (ft/ft)	Length (User Defined) (ft)
1.73	0.007	62
3.37	0.012	3,400
0.00	0.000	4,420
0.00	0.000	4,420
1.73	0.007	62
0.42	0.000	0
0.00	0.000	0
0.00	0.000	0
0.42	0.000	0
3.47	0.014	36
0.00	0.000	0
0.00	0.000	36
0.00	0.000	0
0.00	0.000	0
0.00	0.000	0
0.00	0.000	3,400
3.47	0.016	20

Scottsdale Nation Golf Club

Active Scenario: 2. SNGC + Reata Ph1 - 6 inch FM Only

FlexTable: Pipe Table

Current Time: 0.000 hours

Label	Length (Scaled) (ft)	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)
SNGC 4in FM 1	69	4.22	PVC	130.0	180
4in Combined FM	262	4.22	PVC	130.0	0
Reata 4in FM 1	202	4.22	PVC	130.0	120
Reata 4in FM 2	190	4.20	PVC	130.0	0
SNGC 4in FM2	70	4.20	PVC	130.0	0
P-9	9	12.00	PVC	130.0	-300
P-12	15	6.00	PVC	130.0	120
P-13	15	6.00	PVC	130.0	120
P-14	11	12.00	PVC	130.0	180
P-15	15	4.16	Ductile Iron	130.0	180
P-16	11	12.00	PVC	130.0	0
P-17	14	4.16	Ductile Iron	130.0	0
P-19	17	6.00	PVC	130.0	0
P-20	15	6.00	PVC	130.0	0
6in Combined FM	263	6.00	PVC	130.0	300
P-22	14	4.16	Ductile Iron	130.0	180

Velocity (ft/s)	Headloss Gradient (ft/ft)	Length (User Defined) (ft)
4.13	0.026	122
0.00	0.000	3,400
2.75	0.008	4,420
0.00	0.000	4,420
0.00	0.000	122
0.85	0.000	0
1.36	0.001	0
1.36	0.001	0
0.51	0.000	0
4.25	0.025	16
0.00	0.000	0
0.00	0.000	16
0.00	0.000	0
0.00	0.000	0
3.40	0.008	3,400
4.25	0.023	20

Scottsdale Nation Golf Club
Active Scenario: 3. SNGC - 6 inch FM Only
FlexTable: Pipe Table

Current Time: 0.000 hours

Label	Length (Scaled) (ft)	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)
SNGC 4in FM 1	69	4.16	Ductile Iron	130.0	180
4in Combined FM	262	4.22	PVC	130.0	0
Reata 4in FM 1	202	4.22	PVC	130.0	0
Reata 4in FM 2	190	4.22	PVC	130.0	0
SNGC 4in FM2	70	4.16	Ductile Iron	130.0	0
P-9	9	12.00	PVC	130.0	-180
P-12	15	6.00	PVC	130.0	0
P-13	15	6.00	PVC	130.0	0
P-14	11	12.00	PVC	130.0	180
P-15	15	4.16	Ductile Iron	130.0	180
P-16	11	12.00	PVC	130.0	0
P-17	14	4.16	Ductile Iron	130.0	0
P-19	17	6.00	PVC	130.0	0
P-20	15	6.00	PVC	130.0	0
6in Combined FM	263	6.00	PVC	130.0	180
P-22	14	4.16	Ductile Iron	130.0	180

Velocity (ft/s)	Headloss Gradient (ft/ft)	Length (User Defined) (ft)
4.25	0.037	62
0.00	0.000	3,400
0.00	0.000	4,420
0.00	0.000	4,420
0.00	0.000	62
0.51	0.000	0
0.00	0.000	0
0.00	0.000	0
0.51	0.000	0
4.25	0.020	36
0.00	0.000	0
0.00	0.000	36
0.00	0.000	0
0.00	0.000	0
2.04	0.003	3,400
4.25	0.024	20

Scottsdale Nation Golf Club
Active Scenario: 4. SNGC + Reata Ph2
FlexTable: Pipe Table

Current Time: 0.000 hours

Label	Length (Scaled) (ft)	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)
SNGC 4in FM 1	69	4.22	PVC	130.0	82
4in Combined FM	262	4.22	PVC	130.0	119
Reata 4in FM 1	202	4.22	PVC	130.0	120
Reata 4in FM 2	190	4.22	PVC	130.0	120
SNGC 4in FM2	70	4.20	PVC	130.0	98
P-9	9	12.00	PVC	130.0	-420
P-12	15	6.00	PVC	130.0	240
P-13	15	6.00	PVC	130.0	240
P-14	11	12.00	PVC	130.0	180
P-15	15	4.16	Ductile Iron	130.0	180
P-16	11	12.00	PVC	130.0	0
P-17	14	4.16	Ductile Iron	130.0	0
P-19	17	6.00	PVC	130.0	0
P-20	15	6.00	PVC	130.0	0
6in Combined FM	263	6.00	PVC	130.0	301
P-22	14	4.16	Ductile Iron	130.0	180

Velocity (ft/s)	Headloss Gradient (ft/ft)	Length (User Defined) (ft)
1.87	0.006	122
2.74	0.008	3,400
2.75	0.008	4,420
2.75	0.008	4,420
2.28	0.006	122
1.19	0.001	0
2.72	0.005	0
2.72	0.005	0
0.51	0.000	0
4.25	0.025	16
0.00	0.000	0
0.00	0.000	16
0.00	0.000	0
0.00	0.000	0
3.41	0.008	3,400
4.25	0.023	20

Scottsdale Nation Golf Club
Active Scenario: 5. SNGC - 4 and 6 inch
FlexTable: Pipe Table

Current Time: 0.000 hours

Label	Length (Scaled) (ft)	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)
SNGC 4in FM 1	69	4.16	Ductile Iron	130.0	90
4in Combined FM	262	4.22	PVC	130.0	51
Reata 4in FM 1	202	4.22	PVC	130.0	0
Reata 4in FM 2	190	4.22	PVC	130.0	0
SNGC 4in FM2	70	4.16	Ductile Iron	130.0	90
P-9	9	12.00	PVC	130.0	-180
P-12	15	6.00	PVC	130.0	0
P-13	15	6.00	PVC	130.0	0
P-14	11	12.00	PVC	130.0	180
P-15	15	4.16	Ductile Iron	130.0	180
P-16	11	12.00	PVC	130.0	0
P-17	14	4.16	Ductile Iron	130.0	0
P-19	17	6.00	PVC	130.0	0
P-20	15	6.00	PVC	130.0	0
6in Combined FM	263	6.00	PVC	130.0	129
P-22	14	4.16	Ductile Iron	130.0	180

Velocity (ft/s)	Headloss Gradient (ft/ft)	Length (User Defined) (ft)
2.12	0.010	62
1.17	0.002	3,400
0.00	0.000	4,420
0.00	0.000	4,420
2.12	0.010	62
0.51	0.000	0
0.00	0.000	0
0.00	0.000	0
0.51	0.000	0
4.25	0.020	36
0.00	0.000	0
0.00	0.000	36
0.00	0.000	0
0.00	0.000	0
1.46	0.002	3,400
4.25	0.024	20

Scottsdale Nation Golf Club
Active Scenario: 6. 6 inch FM pipe break
FlexTable: Pipe Table

Current Time: 0.000 hours

Label	Length (Scaled) (ft)	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)
SNGC 4in FM 1	69	4.22	PVC	130.0	50
4in Combined FM	262	4.22	PVC	130.0	190
Reata 4in FM 1	202	4.22	PVC	130.0	70
Reata 4in FM 2	190	4.22	PVC	130.0	70
SNGC 4in FM2	70	4.20	PVC	130.0	0
P-9	9	12.00	PVC	130.0	-190
P-12	15	6.00	PVC	130.0	70
P-13	15	6.00	PVC	130.0	70
P-14	11	12.00	PVC	130.0	50
P-15	15	4.16	Ductile Iron	130.0	50
P-16	11	12.00	PVC	130.0	0
P-17	14	4.16	Ductile Iron	130.0	0
P-19	17	6.00	PVC	130.0	70
P-20	15	6.00	PVC	130.0	70
6in Combined FM	263	6.00	PVC	130.0	0
P-22	14	4.16	Ductile Iron	130.0	50

Velocity (ft/s)	Headloss Gradient (ft/ft)	Length (User Defined) (ft)
1.16	0.002	122
4.36	0.019	3,400
1.60	0.003	4,420
1.60	0.003	4,420
0.00	0.000	122
0.54	0.000	0
0.79	0.001	0
0.79	0.001	0
0.14	0.000	0
1.19	0.002	16
0.00	0.000	0
0.00	0.000	16
0.79	0.001	0
0.79	0.001	0
0.00	0.000	3,400
1.19	0.002	20

Scottsdale Nation Golf Club
Active Scenario: 7. 4 inch FM pipe break
FlexTable: Pipe Table

Current Time: 0.000 hours

Label	Length (Scaled) (ft)	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)
SNGC 4in FM 1	69	4.22	PVC	130.0	110
4in Combined FM	262	4.22	PVC	130.0	0
Reata 4in FM 1	202	4.22	PVC	130.0	114
Reata 4in FM 2	190	4.22	PVC	130.0	114
SNGC 4in FM2	70	4.20	PVC	130.0	0
P-9	9	12.00	PVC	130.0	-338
P-12	15	6.00	PVC	130.0	228
P-13	15	6.00	PVC	130.0	228
P-14	11	12.00	PVC	130.0	110
P-15	15	4.16	Ductile Iron	130.0	110
P-16	11	12.00	PVC	130.0	0
P-17	14	4.16	Ductile Iron	130.0	0
P-19	17	6.00	PVC	130.0	0
P-20	15	6.00	PVC	130.0	0
6in Combined FM	263	6.00	PVC	130.0	338
P-22	14	4.16	Ductile Iron	130.0	110

Velocity (ft/s)	Headloss Gradient (ft/ft)	Length (User Defined) (ft)
2.52	0.010	122
0.00	0.000	3,400
2.62	0.007	4,420
2.62	0.007	4,420
0.00	0.000	122
0.96	0.000	0
2.59	0.005	0
2.59	0.005	0
0.31	0.000	0
2.60	0.010	16
0.00	0.000	0
0.00	0.000	16
0.00	0.000	0
0.00	0.000	0
3.84	0.010	3,400
2.60	0.009	20

APPENDIX C

Selected Equipment

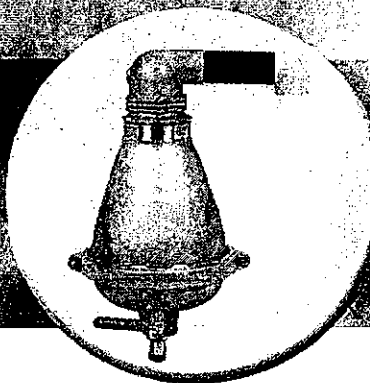
Submersible Pumps & Appurtenances

Valves

Odor Control Systems

Electrical and Controls

NAME (for nameplate) Air / Vacuum Release Valve				LOCATION (structure, area) Meter vault				EQUIPMENT NO.					
NO. OF UNITS (initial/ultimate) 1/1				RATED CONDITIONS & SIZE 2"				OPERATING SPEED NA				WEIGHT	
ENVIRONMENTAL CONDITIONS Outside				ESTIMATED COST \$1375				OPERATING DUTY (continuous, 50%, etc.) Intermittent					
SPECIAL MATERIALS, CONSTRUCTION DETAILS The valve body and cover shall be constructed of ASTM A126 Class B Cast iron; Threaded Inlet													
ACCESSORIES (with equipment numbers, where applicable):													
OPTIONAL Combination valve								MOTOR CONTROL					
								OR ALARM TO STATUS TO CONTROL FM	LOC	PCC	MCC		
MANUFACTURER/REP/PHONE NUMBER A.R.I. Model D-024 STST				CATALOG OR MODEL NO. ASC, I.2,443, T1, DI, R732-NBR-S1- BR-DI, 1340G0*BFA				ESSENTIAL BUS					
M O T O R	HP NA	RPM NA	VOLTS NA	PHASE NA	TYPE (ind., Synch., etc.)				ENCLOSURE (ODP, TEFC, etc.)				
C O N T R O L	EMERGENCY INTERLOCKS (overpressure, temperature, limit switches, etc.)												
O P E R A T I O N	DESCRIPTION OF OPERATION (use additional sheets as required) Air Release Valves shall be fully automatic float operated valves designed to exhaust small pockets of air as needed.												
JOB NO. 113787		BY: KLK		SUBJECT: A/V RV				DATE: 5/1/13		SHEET:			
										REVISED:			
										REVISED:			



D-025 ST PN 16

D-025 STST PN 16



Combination Air Valve For Waste Water "SAAR" Short Version

Description

The combination air valve combines an air & vacuum large orifice and an automatic small orifice in a single body. The valve is specially designed to operate with liquids carrying solid particles such as waste water and effluent. The combination air valve discharges air (gases) during the filling or changing of the system, admits air to the system while draining and at water column separation and discharges accumulated air (gases) from the system while operating under pressure. The valve's unique design guarantees separation of the liquid from the sealing mechanism and provides optimum work conditions.

Operation

The air & vacuum component, discharges air at high flow rates during the filling of the system and admits air into the system at high flow rates during its drainage and at water column separation.

Water entry to the lower portion of the valve will cause the sealing of the valve. At any time during system operation, should internal pressure of the system fall below atmospheric pressure, air will re-enter the system. The smooth release of air prevents pressure surges and other destructive phenomena. Admitting air in response to negative pressure protects the system from destructive vacuum conditions and prevents damage caused by water column separation. Air re-entry is essential to efficiently drain the system. The automatic component releases entrapped air from pressurized systems where the valve is installed.

Without air valves, pockets of accumulated air may cause the following destructive phenomena:

- Obstruction to effective flow and hydraulic conductivity of the system along with a throttling effect similar to a partially closed valve. In extreme cases this will cause complete flow stoppage.
- Accelerate cavitation damages.
- High-pressure surges.
- Accelerate corrosion.
- Danger of a high-energy burst of compressed air.

As the system starts to fill, the valve functions in the following stages:

Air is discharged by the valve.

When the waste water level reaches the valve's lower float, it rises, and draws the "seal plug" to its sealing position.

The entrapped air is confined in a pocket between the waste water and the sealing mechanism. The air pressure is equal to the system pressure.

Increased pressure compresses the trapped air in the upper section of the cone shaped chamber. Due to the conical shape, the large initial air pocket guarantees the height of the air gap. This assures complete separation of the liquid from the sealing mechanism.

Entrapped air (gas) accumulating at peaks and at the crown of the pipe at locations along the system rises to the top of the valve, and displaces liquid in the valve's body.

When the liquid level drops to a point where the float is no longer buoyant, the float will descend, peeling the rolling seal. This action opens the valve's orifice and allows part of the air that accumulated in the upper portion of the valve to be released to the atmosphere. Liquid enters the valve. The float rises, unrolling the rubber seal to its sealing position. The remaining air gap prevents the waste water from fouling the sealing mechanism.

When internal pressure falls below atmospheric pressure:

1. Both orifices will be immediately unplugged as the floats drop.
2. Air is admitted to the system.

Main Features

- Working pressure range: 0.2-16 bar
- Testing pressure: 25 bar
- Working temperature: 60° C.
- Maximum short-term temperature: 90° C.
- The valve's unique design prevents any contact between waste water and the sealing mechanism by creating an air gap at the top of the valve. This air gap is guaranteed even under extreme conditions. These features are achieved by:
 - The conical body shape designed to assure a large initial air/gas pocket, maintaining the maximum distance between the liquid and the Sealing Mechanism; while allowing minimum body height.

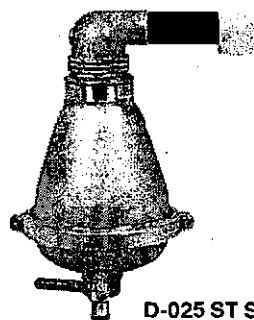
- A spring supported joint between the stem and the upper float assures that vibrations of the lower float will not unseat the air release orifice of the air valve. Release of air will occur only after enough air accumulates. The Rolling Seal Mechanism in the valve design, is less sensitive to pressure changes than a direct float seal. It allows a comparably large orifice for a wide pressure range (up to 16 bar).
- Funnel-shaped lower body is designed to ensure that residue waste water matter will drain to the pipe, to be carried away by the flow, and will not remain in the valve.
- All internal metal parts are made of stainless steel. The floats are made of composite materials.
- 1 1/2" threaded discharge outlet enables removal of excess fluids.
- The valve discharge air at high flow rates, without premature closing.

Valve Selection

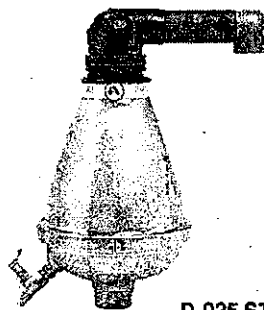
- These valves are manufactured with flanged ends to meet any requested standard. The 2" valves are also available with BSP/NPT male threads.

The valves are available:

- With a Vacuum Guarding, Out-only attachment, which only allows air discharge, not allowing air intake.
- With a Vacuum Breaking, In-only attachment, which only allows air intake, not allowing air discharge.
- With a Non-Slam, discharge-throttling attachment, which allows free air intake, but throttles air discharge.

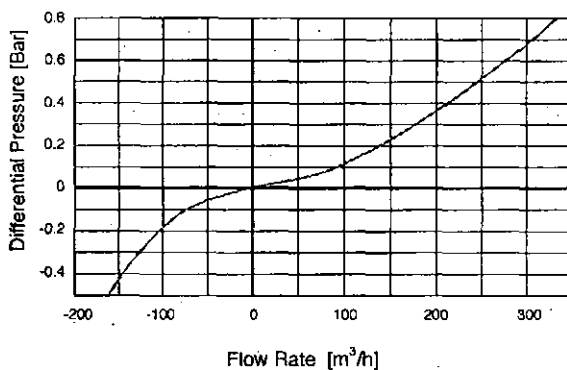


D-025 ST ST

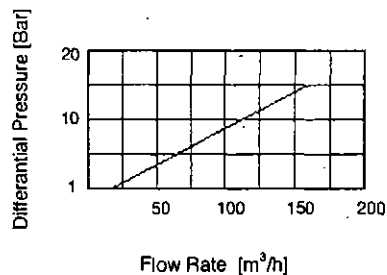


D-025 ST

AIR AND VACUUM FLOW RATE

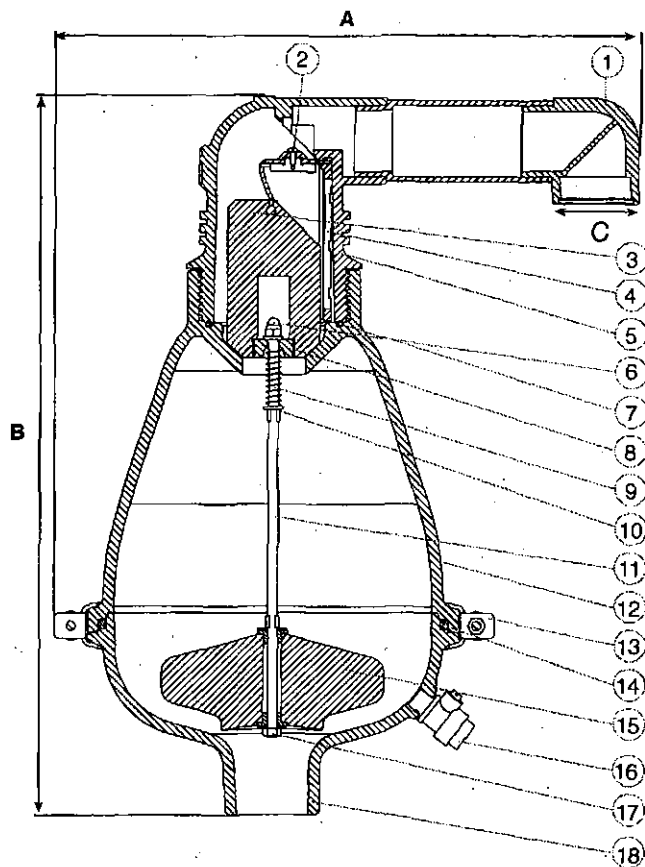


AUTOMATIC AIR DISCHARGE



DIMENSIONS AND WEIGHTS

Nominal Size	Dim. mm			Weight Kg.		Orifice Area mm²	
	A	B	C	D-020 ST	D-020 ST ST	Auto.	A / V
2" (50mm) Threaded	370	455	1.5"	12.4	14.4	12	804
2" (50mm) Flanged	370	460	1.5"	14.2	16.2	12	804
3" (80mm) Flanged	370	460	1.5"	14.8	16.8	12	804
4" (100mm) Flanged	370	460	1.5"	16.5	18.5	12	804



PARTS LIST AND SPECIFICATION

No.	Part	D-025 ST	D-025 STST
1.	Drainage Outlet	Polypropylene	Polypropylene
2.	Seal Plug Ass.	PP + Viton / EPDM + STST SAE 316	PP + Viton + STST SAE 316
3.	Float	Foamed PP	Foamed PP
4.	Clamping Stem	Polypropylene	Polypropylene
5.	Body	Polypropylene	STST SAE 316
6.	Crown Nut	STST SAE 316	STST SAE 316
7.	O-Ring	Viton / EPDM / Buna-N	Viton
8.	Stopper	Viton / Polypropylene	Viton
9.	Spring	STST SAE 316	STST SAE 316
10.	Washer	STST SAE 316	STST SAE 316
11.	Stem	STST SAE 316	STST SAE 316
12.	Body	STST SAE 316/317	STST SAE 316/317
13.	Clamp	STST SAE 316	STST SAE 316
14.	O-Ring	Viton / EPDM / Buna-N	Viton
15.	Float	Foamed PP	Foamed PP
16.	Ball Valve 1"	STST SAE 316	STST SAE 316
17.	Washer	STST SAE 316	STST SAE 316
18.	Base	STST SAE 316/317	STST SAE 316/317

PP=Polypropylene STST=Stainless Steel

For best adjustment, it is recommended to send the fluids chemical properties along with the requirement.

A.R.I. FLOW CONTROL ACCESSORIES Ltd. www.arivalves.com ari@ari.co.il Tel: 972-4-6761988

A.R.I. FLOW CONTROL ACCESSORIES Ltd. reserves the right to make product changes without prior notice. To insure receiving updated information on parts specifications, please call the export dept. at the A.R.I. factory. A.R.I. FLOW CONTROL ACCESSORIES Ltd. shall not be held liable for any errors. All rights reserved.

NAME (for nameplate) Chemical feed pump		LOCATION			EQUIPMENT NO.																						
NO. OF UNITS (initial/ultimate) 2/2		RATED CONDITIONS & SIZE 8 to 63 mL/min at 65 psig		OPERATING SPEED 90 rpm		WEIGHT																					
ENVIRONMENTAL CONDITIONS outside		ESTIMATED COST		OPERATING DUTY																							
SPECIAL MATERIALS, CONSTRUCTION DETAILS																											
ACCESSORIES (with equipment numbers, where applicable):																											
1/16" 50' 1/8" floprene tubing Tubing rupture detector EB-120 injector Saf-T-Flo flex hose				<table border="1"> <tr> <th colspan="4">MOTOR CONTROL</th> </tr> <tr> <td colspan="4">JOB STANDARD <input type="checkbox"/></td> </tr> <tr> <td rowspan="4">OR ALARM TO STATUS TO CONTROL FM</td> <td>LOC</td> <td>PCC</td> <td>MCC</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>			MOTOR CONTROL				JOB STANDARD <input type="checkbox"/>				OR ALARM TO STATUS TO CONTROL FM	LOC	PCC	MCC									
MOTOR CONTROL																											
JOB STANDARD <input type="checkbox"/>																											
OR ALARM TO STATUS TO CONTROL FM	LOC	PCC	MCC																								
MANUFACTURER/REP/PHONE NUMBER Flomotion/ Rick Reed 602-650-1557			CATALOG OR MODEL NO. See attached			ESSENTIAL BUS YES <input type="checkbox"/> NO <input type="checkbox"/> PRIORITY 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/>																					
MOTOR	HP 1/4	RPM 168	VOLTS 120	PHASE 1	TYPE	ENCLOSURE																					
CONTROL																											
OPERATION	DESCRIPTION OF OPERATION:																										
JOB NO. 113787	BY: KLK	SUBJECT:		DATE: 5/1/13	SHEET: 1 REVISED: REVISED:																						



Chemical Feeding Technologies, Inc.

Quality Products for Environmental Quality®

January 11, 2013

TO: Wood/Patel & Associates
E-mail: vruiiz@woodpatel.com
2 pages transmitted

ATTN: Vince Ruiz

FROM: Richard Reed

SUBJECT: FloMotion Single Pump Skid

REF: Chemical Feeding Technologies, Inc. Quote # R011113C

We are pleased to provide the following prices for equipment that you requested:

Item	Qty	Description	Manufacturer Model Number
1.	1	DUAL PUMP SKID SYSTEM WITH THE FOLLOWING FEATURES:	FLOMOTION SYSTEMS, INC. PP-2H
	2	VARIABLE SPEED PERISTALTIC PUMP WITH SEALED PUMP HEAD, SPRING LOADED ROLLER ASSEMBLY WITH 1/4 H.P. INVERTER DUTY TEFC MOTOR, <u>1.8 TO 168 RPM RANGE.</u>	FLOMOTION SYSTEMS 2001H-10
	2	SKID MOUNTED CONTROLLER WITH LED DISPLAY AND SIX POSITION KEYPAD, SELECTABLE MANUAL OR AUTOMATIC CONTROL VIA 4-20 mADC PROCESS SIGNAL, NEMA 4X ENCLOSURE, 120 VAC POWER.	PART OF PUMP MODEL #
	2	TUBING RUPTURE DETECTOR UNIT TO SENSE RUPTURE OF PUMP TUBING AND CLOSE ALARM RELAY CONTACT RATED AT 5 AMPS, 250 VAC, 120 VAC POWER.	FLOMOTION FFLD-1
	50	1.6 mm (1/16") FEET, 3.2 mm (1/8") BORE TUBING TO PROVIDE FEED RATES FROM 0.05 TO 5.00 GPH AT 100 PSI BACK PRESSURE.	FLOMOTION FLO.032.024
	4	MACHINED PVC COLOR CODED AND LEAK PROOF COMPRESSION TUBING ADAPTERS WITH VITON O-RINGS TO CONVERT 1/8" ^{1/16"} I.D. TUBING TO 1/2" MNPT PROCESS CONNECTION.	FLOMOTION 050N2432PV

1	500 mL CLEAR PVC CALIBRATION COLUMN WITH SEALED TOP.	FLOMOTION CA500SS
1	0-60 PSI PRESSURE GAUGE WITH PVC/VITON PROTECTIVE DIAPHRAGM.	FLOMOTION FGI-PVG-060-X
1	12 cu. in. PVC/VITON PULSATION DAMPENER WITH CHARGING VALVE AND PRESSURE GAUGE.	FLOMOTION FL12PV
1	½" PVC/TFE PRESSURE RELIEF VALVE, 3 PORT DESIGN.	FLOMOTION BA499P
1	½" PVC/TFE BACK PRESSURE/ANTI-SYPHON VALVE.	FLOMOTION PA499P
1	PLASTIC SKID WITH LEAK CONTAINMENT AND ALL THE ABOVE ITEMS MOUNTED AND PLUMBED AS A FUNCTIONAL SYSTEM.	FLOMOTION
2.	1 LOT OF FIELD LABOR AND TRAVEL TIME FOR EQUIPMENT START-UP CHECKOUT AND OPERATOR TRAINING.	CHEMICAL FEEDING TECHNOLOGIES, INC.

**LUMP SUM PRICE, FOB SHIPPING POINT,
WITH FULL FREIGHT ALLOWED TO JOB SITE \$ 10,995.00**

NOTES:

1. The FFLD-1 tubing rupture detector will sense a leak in the pump head tubing, shut down the leaking pump and turn on the standby pump.
2. Estimated shipment, from New York, is 4 – 6 weeks after submittal approval.

The above price is FOB shipping point, subject to review after 30 days, and does not include any applicable sales or use taxes. Our terms of sale, upon credit approval, are NET 30 days from date of invoice.

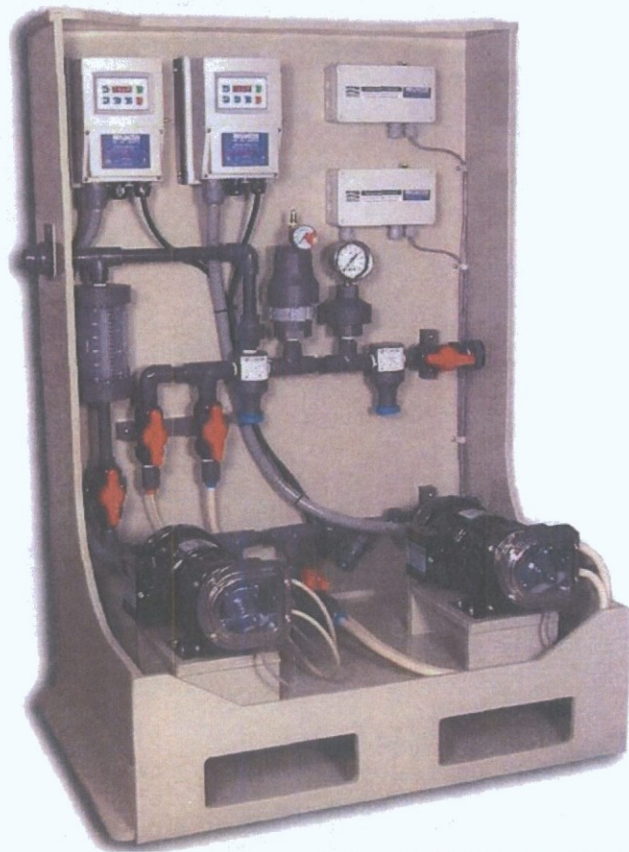
Please feel free to call if you have any questions. Thank you for this opportunity to be of service.

Chemical Feeding Technologies, Inc.

Phone: 602/650-1557 Fax: 602/277-2270 E-mail: rick@chemfeedtech.com

PRE-ENGINEERED CHEMICAL METERING SYSTEMS

Pre-Packaged & Self-Contained Chemical Feed Systems



PP-2H Dual Pump System with NEMA 4x Controllers

FEATURES

- Suitable for base or wall mounting
- Flow rates to 50 GPH, pressures to 100 PSI
- Integral leak containment with optional Tubing Rupture Detector relay output that can start a back-up pump and/or signal an operator remotely via an autodialer.
- Rugged industrial TEFC motors.
- Seal-less pumping technology.
- Self-priming – suction lifts to 30 ft.
- No check valves – few moving parts.

STANDARD EQUIPMENT

- FLOMOTION SYSTEMS 2001H Series Peristaltic Pump with NEMA 4x Controller
- Back pressure and Pressure Relief Valves
- 500ml Calibration Cylinder
- Pulsation Dampener
- Diaphragm Protected Pressure Gauge
- Suction Wye Strainer
- PVC Ball Valves
- Leakproof Tubing Connectors



OPTIONAL EQUIPMENT

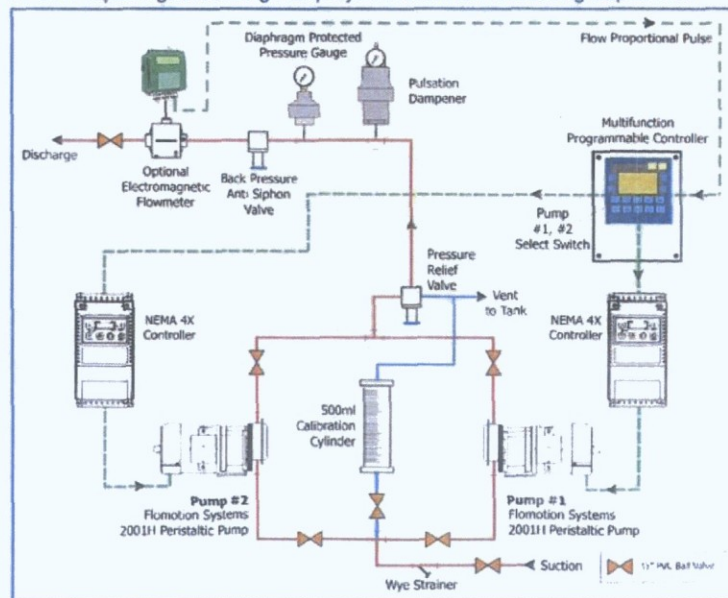
- Multi-Function Controller
- Flowmeters
- Tubing Rupture Detection
- Supply Tank Level Monitoring
- Tanks
- On-Line Analyzers
- Corp Stops with Solution Tube Assembly

SPECIFICATIONS

- Single and Multiple Pump Configurations
- Panel Material: Polypropylene or Fiberglass
- Process Piping Material: PVC
- Process Connections: 1/2" NPT
- Dimensions: 48"H x 30"W x 14.5"D
- Weight (PP-2H shown): 130 Lbs. (w/pumps)
- Power: 115 VAC

FLOMOTION SYSTEMS INC.
165 Creekside Drive, Suite 112
Buffalo NY 14228-2103
Tel: 800-909-FLOW (3569)
Tel: 716-691-3941 Fax: 716-691-1253
Email: Info@FlomotionSystems.com
www.FlomotionSystems.com

PP-2H Prepackaged Metering Pump System with Flow Monitoring Capabilities



CHEMICAL FEED SYSTEMS

Series 2001H/HE/HEC



INDUSTRIAL HOSE PUMPS

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



The 2001H (above right) includes a full-featured wall-mounted controller. The 2001HE and HEC come with an economical NEMA 4x controller. The compact 2001HEC (above left) features the controller conveniently mounted on the pump. All 2001 Series pumps feature a unique sealed peristaltic pumphead, with leak detection, which protects against corrosive and dangerous chemical spills.



Exceptional self-priming capabilities make the 2001HE Series an ideal choice for hard-to-handle chemicals such as sodium hypochlorite, hydrogen peroxide or viscous polymers.

A wide range of flow outputs can be obtained by simply changing the tubing size. 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.

The 2001HE Series pump system also allows you to mount the controller on the wall ... away from the harsh environment.

2001H/HE/HEC FEATURES

- Flows to 50 GPH, Pressures to 100 psi.*
- Rugged industrial drive uses NEMA TEFC motors.
- Seal-less pumping technology.
- Self-priming – suction lifts to 30 ft.
- No check valves – few moving parts.
- Local or Remote wall mount controller with backlit digital display & integral keypad.
- Dry run capability.
- User selectable manual or automatic control.
- Various long life chemical resistant tubing options available.
- Automatic control available via 0-10VDC or 4-20mA.

* Pressure rating dependent on tubing size.



An optional tubing rupture detector will automatically shut down the 2001H pump and signal an alarm in the event of a tubing leak. Used in conjunction with the unique sealed pump design, the FLOMOTION Tubing Rupture Detector helps to protect operators and other equipment from potentially dangerous fumes and chemicals.

PERISTALTIC PUMPS

FLOMOTION 2001H, HE & HEC ENGINEERING SPECIFICATIONS

MOTOR

- 1/4 HP TEFC Inverter Duty.

MECHANICAL

- Pump weight: 20 lbs.
- Controller weight: 1 lb.
- Pump Finish: Corrosion resistant epoxy coated.
- Color: Black.

TUBING DESCRIPTIONS

- FLOPRENE™
Thermoplastic elastomer
- TYGOPRENE XL-60
PVC based thermoplastic
- NORPRENE¹
Thermoplastic elastomer
- CHEMSURE²
Fluoroelastomer

¹ Registered Trademark of Saint-Gobain Performance Plastics
² Registered Trademark of W.L. Gore & Associates

AGENCY APPROVALS



2001H CONTROLLER

- Wall mount with two-line backlit LCD display.
- Integral 8 button keypad.
- Selectable manual or automatic control via 0-10 VDC or 4-20 mA.
- RS-485 serial communications.
- Remote start/stop input.
- 4-20mA speed output signal.
- Pump run timer.
- NEMA 4 enclosure.
- 115 VAC input, 230 VAC 3-phase optional.

2001HE/HEC CONTROLLER

- Wall or pump mount with LED display.
- Integral 6 button keypad.
- Selectable manual or automatic control via 0-10 VDC or 4-20 mA.
- Remote start/stop capabilities.
- 4-20mA speed output signal.
- NEMA 4X enclosure.
- 115 VAC input, 230VAC 3-phase opt.

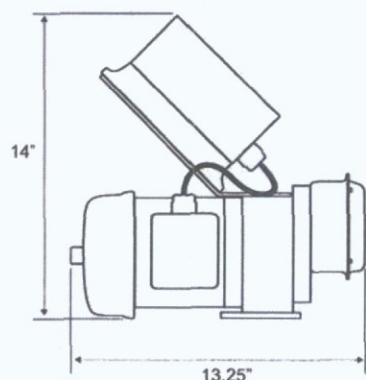
2001H, HE & HEC Estimated Pumping Capacity*

*Actual flow rates may vary

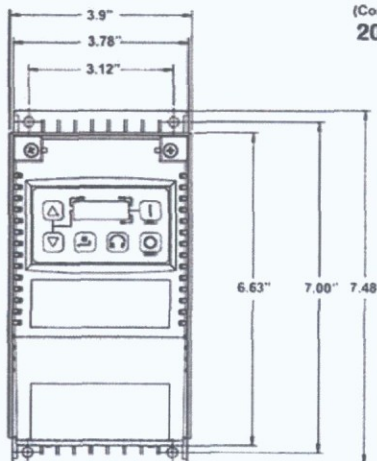
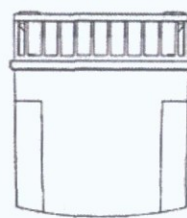
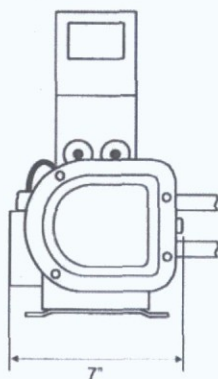
Tubing No.	#119	#120	#15	#24	#35 & 121	#36 & 122
Tubing Size	1.6mm bore (1/16")	3.2mm bore (1/8")	4.8mm bore (3/16")	6.4mm bore (1/4")	8mm bore (5/16")	9.6mm bore (3/8")
ml/min @ 0.6-90 rpm	0.27 - 41 (0.004 - 0.64 gph)	1.13 - 169 (0.02 - 2.68 gph)	2.46 - 369 (0.04 - 5.85 gph)	4.44 - 666 (0.07 - 10.56 gph)	6.60 - 990 (0.10 - 15.69 gph)	8.64 - 1296 (0.14 - 20.54 gph)
ml/min @ 1.8 - 220 rpm	0.81 - 99 (0.013 - 1.57 gph)	3.38 - 414 (0.05 - 6.56 gph)	7.38 - 902 (0.12 - 14.30 gph)	13.32 - 1628 (0.21 - 25.80 gph)	19.80 - 2420 (0.31 - 38.36 gph)	25.92 - 3168 (0.41 - 50.21 gph)
ml/rev*	0.45	1.88	4.1	7.4	11	14.4

PSI Limit 100 100 70 50 30 30

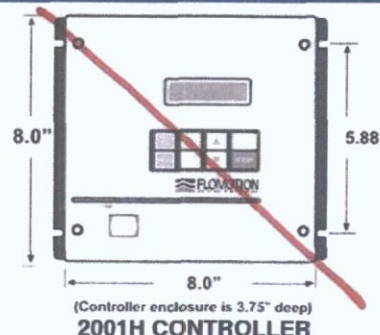
DIMENSIONS



2001HEC

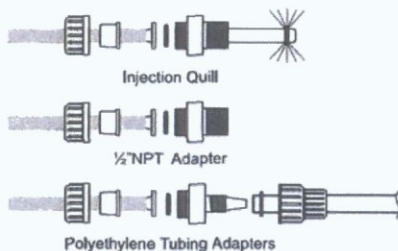


2001HE & HEC CONTROLLER



(Controller enclosure is 3.75" deep)

2001H CONTROLLER



TUBING CONNECTORS

FLOMOTION SYSTEMS Inc.

165 Creekside Drive, Suite 112

Buffalo NY 14228-2103

Tel: 716-691-3941

Fax: 716-691-1253

Email: Info@FlomotionSystems.com

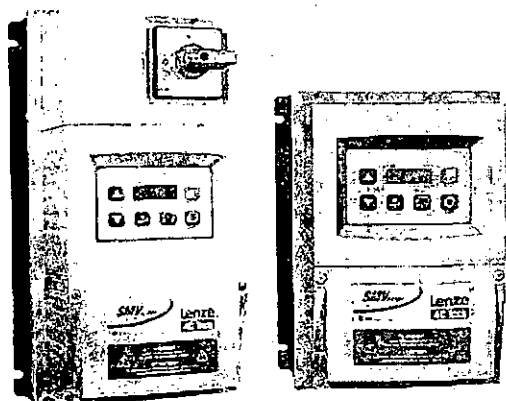
www.FlomotionSystems.com



SMVector NEMA4X

Washdown Duty Inverter Lenze

AC Tech



RoHS
COMPLIANT

World Class Control

Modes of Operation

- Open Loop Flux Vector, Speed or Torque Control with Auto Tuning
- V/Hz (Constant or Variable)
- Base Frequency Adjustable to Motor Specs
- Enhanced V/Hz with Auto-tuning

Acceleration/Deceleration Profiles

- Two Independent Accel Ramps
- Two Independent Decel Ramps
- Linear, S-Type
- Auxiliary Ramp(or Coast)-to-Stop

Fixed Accel Boost for Improved Starting

500 Hz Output Frequency

High Carrier (PWM Sine-Coded) Frequency

- 4, 6, 8, 10 or 12 kHz

Universal Logic Assertion (Selectable)

- Positive or Negative Logic Input
- Digital Reference Available

Braking Functions

- DC Injection Braking
- Optional Dynamic Braking

Speed Commands

- Keypad, Potentiometer
- Jog, 8 Preset Speeds
- Floating Point Control
- Voltage: Scalable 0-10 VDC
- Current: Scalable 4-20 mA

Process Control

- PID Modes: Direct and Reverse Acting
- PID Sleep Mode
- Analog Output (Speed, Load, Torque, kW)
- Network Speed (Baud Rate)
- Terminal and Keypad Status
- Elapsed Run or Power On Time (Hours)

Status Outputs

- Programmable Form "A" Relay Output
- Programmable Open Collector Output
- Scalable 0-10 VDC / 2-10 VDC Analog Output
- 4-20mA w/500 Ohm Total Impedance

Environment

Ambient Temperature

- 10 to 55°C @ 6 kHz
- Derate 2.5% per °C Above 40°C

Comprehensive Diagnostic Tools

Real Time Monitoring

- 8 Register Fault History
- Software Version
- Drive Network ID
- DC Bus Voltage (V)
- Motor Voltage (V)
- Output Current (%)
- Motor Current (A)
- Motor Torque (%)
- Power (kW)
- Energy Consumption (kWh)
- Heatsink Temperature (°C)
- 0-10 VDC Input (User Defined)
- 4-20 mA Input (User Defined)
- PID Feedback (User Defined)

Vigilant System Protection

Voltage Monitoring

- Low and High DC Bus V Protection
- Low Line V Compensation

Current Monitoring

- Motor Overload Protection
- Current Limiting Safeguard
- Ground Fault
- Short Circuit Protection

Three ReStarts

- Two Flying and One Auto
- User Enabled

Loss of Follower Management

- Protective Fault
- Go to Preset Speed or Preset Setpoint
- Initiate System Notification

Over Temperature Protection

International Voltages

- +10/-15% Tolerance
- 120/240V, 1Ø
- 200/240V, 1 or 3Ø
- 200/240V, 3Ø
- 400/480V, 3Ø
- 480/600V, 3Ø

Global Standards

- UL GOST
- cUL C-Tick
- CE Low Voltage (EN61800-5-1)
- CE EMC (EN61800-3) with optional EMC filter

Keypad & Display

Simple Six Button Programming

- Start
- Stop
- Forward/Reverse
- Scroll Up
- Scroll Down
- Enter/Mode

Informative LED Display

Vivid Illumination

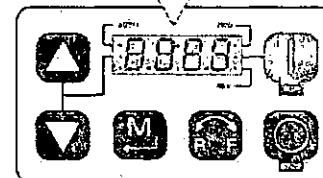
Easily Read from a Distance

Five Status LEDs

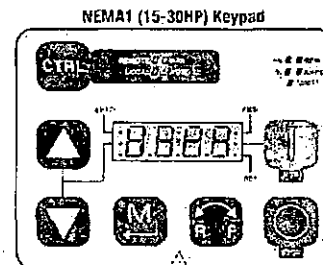
- Run
- Automatic Speed mode
- Manual Speed Mode
- Forward Rotation
- Reverse Rotation

Status Display

- Motor Status
- Fault Management
- Operational Information



NEMA1 (Up to 10HP) Keypad



NEMA1 (15-30HP) Keypad

Additional CTRL Button

Switch between control modes

- Local-Manual
- Local Auto
- Remote-Manual
- Remote Auto

Additional LED Indicators

Define the units being displayed

- Hz
- RPM
- %
- Amps
- /Units

Control Terminals

- Digital Inputs
 - Dedicated Start/Stop
 - (3) Programmable
- Analog Inputs
 - 0-10 VDC
 - 4-20 mA
- Digital Outputs
 - Form "A" Relay
 - Open Collector
- Analog Outputs
 - 0-10 VDC
 - 2-10 VDC

Power Supplies

- 10 VDC Potentiometer Ref
- 12 VDC, 20 mA DI Ref or 0VDC Com
- 12 VDC, 50 mA Supply

Common

Additional Control Terminals (15 HP & up)

- 1 Programmable Digital Input
- 1 Common
- RS-485 Modbus Communications
 - TXA
 - TXB

Ratings

120/240V* - 1Ø Input (3Ø Output)						
Power	Output Current	NEMA4X			NEMA4X w/Disconnect	
		Indoor (C) / Outdoor (E)			Indoor	
Hp	KW	I _L [A]	Model	Size	Model	Size
0.5	0.37	2.4	ESV371N01SX[C] or [E]	R1	ESV371N01SMC	AA1
1	0.75	4.7	ESV751N01SX[C] or [E]	R1	ESV751N01SMC	AA1
1.5	1.1	6.0	ESV112N01SX[C] or [E]	R2	ESV112N01SMC	AA2

*120/240V models provide 0-230V output even with 120V input applied.

200/240V - 1 or 3Ø Input (3Ø Output)						
Power	Output Current	NEMA4X			NEMA4X w/Disconnect	
		Indoor (C) / Outdoor (E)*			Indoor**	
Hp	KW	I _L [A]	Model	Size	Model	Size
0.5	0.37	2.4	ESV371N02YX[C] or [E]	R1	ESV371N02YMC	AA1
1	0.75	4.2	ESV751N02YX[C] or [E]	R1	ESV751N02YMC	AA1
1.5	1.1	5.0	ESV112N02YX[C] or [E]	R2	ESV112N02YMC	AA2
2	1.5	7.0	ESV152N02YX[C] or [E]	R2	ESV152N02YMC	AA2
3	2.2	9.6	ESV222N02YX[C] or [E]	S1	ESV222N02YMC	AD1

*Filter versions are also available in 1-phase: Replace the "YX" in the Model Part Number with an "SF".
**Filter versions are also available in 1-phase: Replace the "YM" in the Model Part Number with an "SL".

200/240V - 3Ø Input (3Ø Output)						
Power	Output Current	NEMA4X			NEMA4X w/Disconnect	
		Indoor (C or D) / Outdoor (E or F)			Indoor	
Hp	KW	I _L [A]	Model	Size	Model	Size
5	4	16.5	ESV402N02TX[C] or [E]	V1	ESV402N02TMC	AC1
7.5	5.5	23	ESV552N02TX[D] or [F]	T1	ESV552N02TMD	AB1
10	7.5	29	ESV752N02TX[D] or [F]	T1	ESV752N02TMD	AB1
15	11	42	ESV113N02TX[D] or [F]	W1	ESV113N02TMD	AE1
20	15	54	ESV153N02TX[D] or [F]	W1	ESV153N02TMD	AE1

400/480V - 3Ø Input (3Ø Output)						
Power	Output Current	NEMA4X			NEMA4X w/Disconnect	
		Indoor (C or D) / Outdoor (E or F)*			Indoor**	
Hp	KW	I _L [A]	Model	Size	Model	Size
0.5	0.37	1.3/1.1	ESV371N04TX[C] or [E]	R1	ESV371N04TMC	AA1
1	0.75	2.4/2.1	ESV751N04TX[C] or [E]	R1	ESV751N04TMC	AA1
1.5	1.1	3.5/3.0	ESV112N04TX[C] or [E]	R2	ESV112N04TMC	AA2
2	1.5	4.0/3.5	ESV152N04TX[C] or [E]	R2	ESV152N04TMC	AA2
3	2.2	5.5/4.8	ESV222N04TX[C] or [E]	R2	ESV222N04TMC	AA2
4	3.0	7.6/6.3	ESV302N04TX[C] or [E]	R2	ESV302N04TMC	AA2
5	4	9.4/8.2	ESV402N04TX[C] or [E]	V1	ESV402N04TMC	AC1
7.5	5.5	12.6/11	ESV552N04TX[C] or [E]	V1	ESV552N04TMC	AC1
10	7.5	16.1/14	ESV752N04TX[D] or [F]	T1	ESV752N04TMD	AB1
15	11	24/21	ESV113N04TX[D] or [F]	W1	ESV113N04TMD	AE1
20	15	31/27	ESV153N04TX[D] or [F]	W1	ESV153N04TMD	AE1
25	18.5	39/34	ESV183N04TX[D] or [F]	W1	ESV183N04TMD	AE1
30	22	46/40	ESV223N04TX[D] or [F]	X1	ESV223N04TMD	AF1

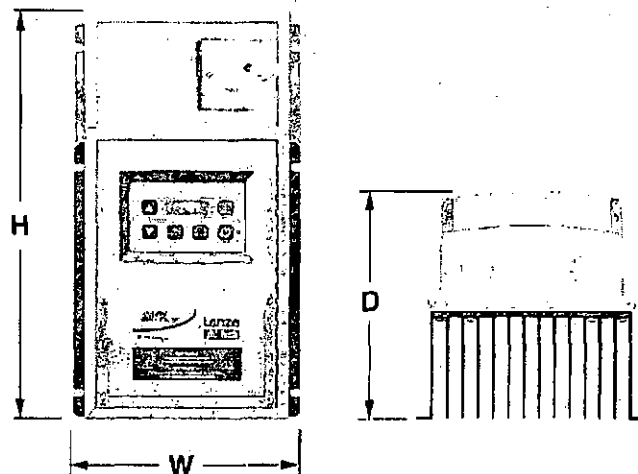
*Filter versions are also available in 1-phase: Replace the "X" in the Model Part Number with an "F".
**Filter versions are also available in 1-phase: Replace the "M" in the Model Part Number with an "L".

600V - 3Ø Input (3Ø Output)						
Power	Output Current	NEMA4X			NEMA4X w/Disconnect	
		Indoor (C or D) / Outdoor (E or F)			Indoor	
Hp	KW	I _L [A]	Model	Size	Model	Size
1	0.75	1.7	ESV751N06TX[C] or [E]	R1	ESV751N06TMC	AA1
2	1.5	2.7	ESV152N06TX[C] or [E]	R2	ESV152N06TMC	AA2
3	2.2	3.9	ESV222N06TX[C] or [E]	R2	ESV222N06TMC	AA2
5	4	6.1	ESV402N06TX[C] or [E]	V1	ESV402N06TMC	AC1
7.5	5.5	9	ESV552N06TX[C] or [E]	V1	ESV552N06TMC	AC1
10	7.5	11	ESV752N06TX[D] or [F]	T1	ESV752N06TMD	AB1
15	11	17	ESV113N06TX[D] or [F]	W1	ESV113N06TMD	AE1
20	15	22	ESV153N06TX[D] or [F]	W1	ESV153N06TMD	AE1
25	18.5	27	ESV183N06TX[D] or [F]	W1	ESV183N06TMD	AE1
30	22	32	ESV223N06TX[D] or [F]	X1	ESV223N06TMD	AF1

Dimensions

	H			W			D	
	in.	mm	in.	mm	in.	mm	in.	mm
R1	8.00	203	6.30	160	4.50	114		
R2	8.00	203	6.30	160	6.30	160		
S1	8.00	203	7.10	181	6.80	172		
T1	10.00	254	8.10	204	8.00	203		
V1	10.00	254	9.00	228	8.00	203		
W1	14.40	366	9.40	240	9.50	241		
X1	18.50	470	9.40	240	9.50	241		
AA1 (H)	11.00	279	6.30	160	5.40	136		
AA2 (H)	11.00	279	6.30	160	7.20	182		
AB1 (H)	13.00	330	8.10	204	8.90	225		
AC1 (H)	13.00	330	9.00	228	9.00	226		
AD1 (H)	11.00	279	7.10	181	7.70	194		
AE1 (H)	14.40	366	9.40	240	10.30	261		
AF1 (H)	18.50	470	9.40	240	11.20	285		

(H) The "D" (depth) dimension includes the disconnect switch.



Options

Communication Modules (Only one Communication Module can be installed at a time.)

Item Number	Item Description
ESVZAC0	CANopen Communications Interface Module
ESVZAR0	RS-485/Modbus Communications Interface Module
ESVZAP0	PROFIBUS DP Communications Interface Module
ESVZAD0	DeviceNet Communications Interface Module
ESVZAE0	EtherNet/IP Communications Interface Module

Keypad

ESVZXK1	Remote Keypad w/ drive interface module & cable up to 10HP (7.5kW)
ESVZXH0	Remote Keypad w/ cable 15HP (11kW) and up

Additional I/O (Cannot be used with Communication Modules or Remote Keypad ESVZXK1)

ESVZAL0	Additional Form C Relay Output Module
ESVZAL1	Additional I/O Module w/ 1 Form C Relay Output and 2 Digital Inputs

Potentiometer (Cannot be used with Communication Modules, Remote Keypad or Additional I/O.)

ESVZXM1	NEMA 4X terminal cover with integral speed potentiometer (W = 6.3 or 7.1 in)
ESVZXM2	NEMA 4X terminal cover with integral speed potentiometer (W = 9.0 or 8.1 in)
ESVZXM3	NEMA 4X terminal cover with integral speed potentiometer (W = 9.4 in)

Dynamic Braking Modules with Built-in Resistors

HP	(KW)	208 to 230 V	Motor Voltage	400 to 480 V	480 to 600 V
		Part Number	Part Number	Part Number	Part Number
0.33 - 0.5	(0.25 - 0.37)	EXX083712A1	EXX083714A1	N/A	N/A
1 - 1.5	(0.75 - 1.1)	EXX081122A1	EXX081124A1	EXX081126A1	EXX081128A1
2 - 3	(1.5 - 2.2)	EXX082222A1	EXX082224A1	EXX082226A1	EXX082228A1
5	(4)	EXX084022A1	EXX084024A1	EXX084026A1	EXX084028A1
7.5	(5.5)	EXX085522A1	EXX085524A1	EXX085526A1	EXX085528A1
10	(7.5)	EXX087522A1	EXX087524A1	EXX087526A1	EXX087528A1

Dynamic Braking Modules without Built-in Resistors

15 - 20	(11 - 15)	EXX0C1532A1	N/A	N/A
15 - 30	(11 - 22)	N/A	EXX0C2234A1	EXX0C2236A1

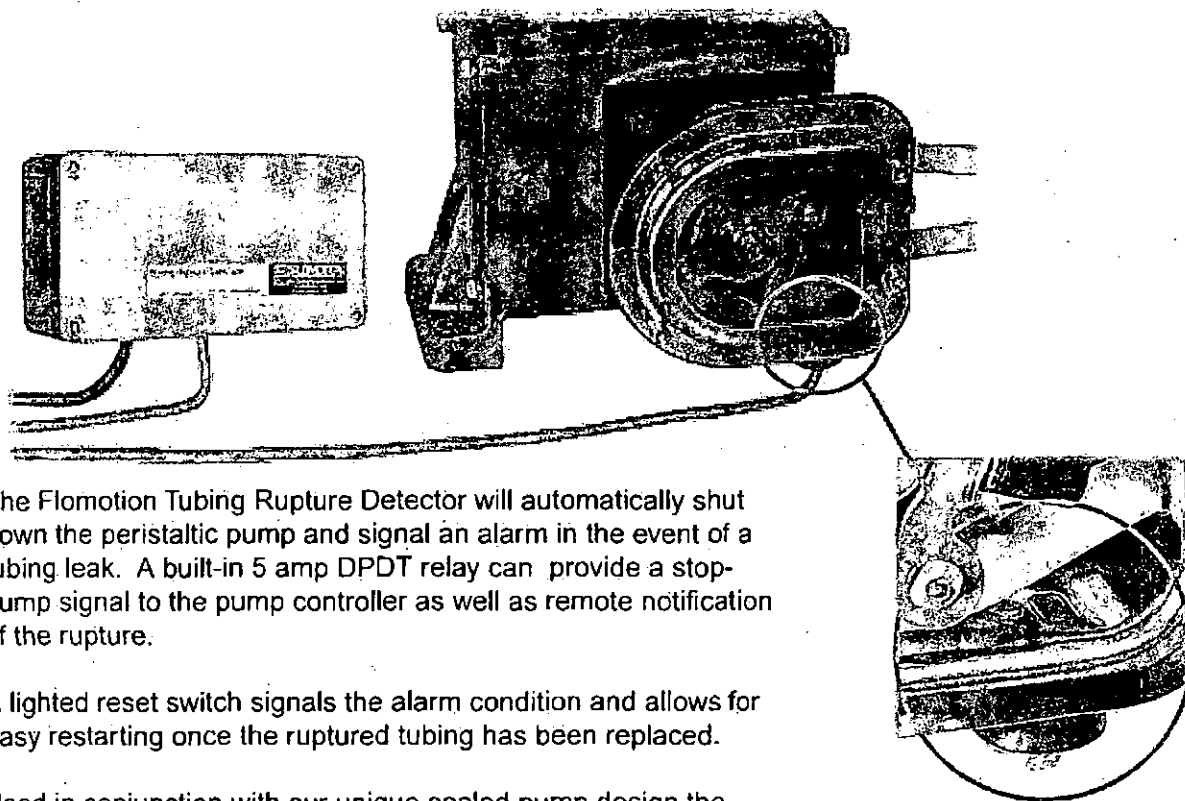
Open Dynamic Braking Resistors with mounting brackets

15 - 20	(11 - 15)	841-009	841-009	841-010
25 - 30	(18.5 - 22)	N/A	841-011	841-012

TUBING RUPTURE DETECTOR



Designed to sense and alarm on chemical leaks due to ruptured peristaltic pump tubing.



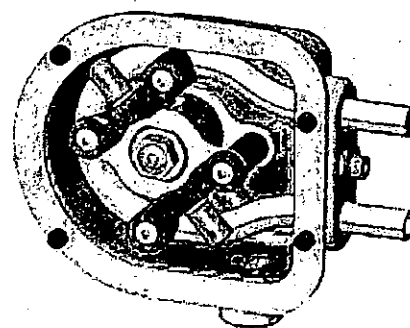
The Flomotion Tubing Rupture Detector will automatically shut down the peristaltic pump and signal an alarm in the event of a tubing leak. A built-in 5 amp DPDT relay can provide a stop-pump signal to the pump controller as well as remote notification of the rupture.

A lighted reset switch signals the alarm condition and allows for easy restarting once the ruptured tubing has been replaced.

Used in conjunction with our unique sealed pump design the FLOMOTION Tubing Rupture Detector helps to protect operators and other equipment from potentially dangerous fumes and chemicals.

FEATURES - Model FFLD-1

- LED signals alarm condition.
- Single reset pushbutton for simple operation.
- 5 amp @250VAC DPDT latching relay for alarm and signal outputs.
- Chemical resistant stainless steel electrodes.
- No moving parts.
- Wall-mount enclosure.
- Automatic restart after power interruptions



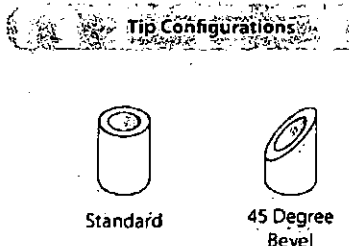
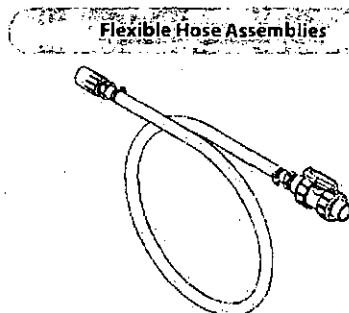
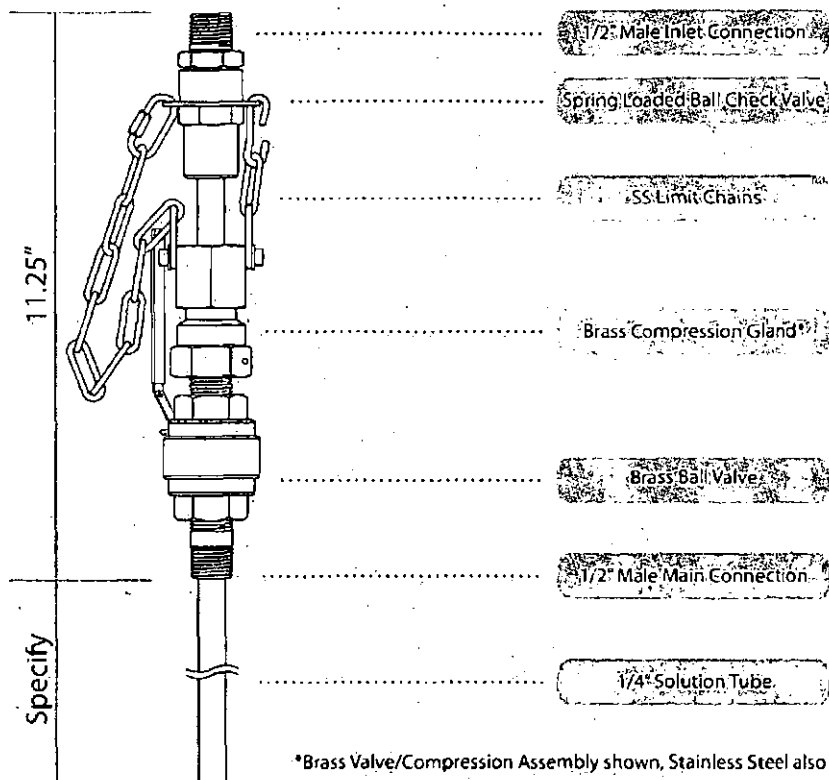
PERISTALTIC PUMPS

FLOMOTION SYSTEMS Inc.
165 Creekside Drive, Suite 112, Buffalo NY 14228-2103
Tel: 800-909-FLOW (3569)
Tel: 716-691-3941 Fax: 716-691-1253
Email: info@flomotionsystems.com
www.FlomotionSystems.com

EB-120 Series

Retractable Injector 150psi Rated w/Check Valve

1/2" Main Connection x 1/4" Solution Tube



*Brass Valve/Compression Assembly shown, Stainless Steel also available, see ordering options below.

Ordering Information

Sample Part Number: **EB-120-B-P-(specify)-0-V**

Series	Valve/Compression Material	Solution Tube Material	Insertion Length	Tip Configuration	Check Valve Seal Type	Flexible Hose Assembly
EB-120	S	H	2	B	V	FHA-CR-050-P-V
EB-120	B = Brass S = Stainless Steel	P = PVC C = CPVC S = Stainless Steel H = HASTELLOY® C-276 A = Alloy 20 T = Titanium G2	(Specify) Note: PVC, CPVC, models have a maximum warranted insertion length of 6 inches. Consult factory for lengths greater than 6 inches.	0 = Standard B = 45° Bevel	V = Viton E = EPDM K = Kalrez®	See Flexible Hose Assembly Product Page For Ordering Options. (Pressure ratings for flexible hose assemblies may differ from rating of the injector)

Technical Notes

- PVC and CPVC Solution Tubes are Schedule 80 pipe with an O.D. of 0.540 inches and an average I.D. of 0.282 inches.
- Alloy Solution Tubes are Schedule 40 pipe with an O.D. of 0.540 inches and an average I.D. of 0.344 inches. Schedule 80 Alloy Solution Tubes are available upon request - consult factory for details.
- SAF-T-FLO does not recommend nor warranty PVC/CPVC Solution Tubes where velocities in the process main exceed 6 fps.
- No-Lead Brass is not available on the EB-120 series, select Stainless Steel instead as alternate.
- Main Connection and Inlet Connection are NPT by default. BSP thread options are available. Consult factory for details.

HASTELLOY® is a registered trademark of Haynes International, Inc.
Kalrez® is a registered trademark of DuPont Performance Elastomers L.L.C.

NAME (for nameplate) Emergency eyewash shower			LOCATION Near chemical storage tank			EQUIPMENT NO.			
NO. OF UNITS (initial/ultimate) 1/1			RATED CONDITIONS & SIZE			OPERATING SPEED		WEIGHT	
ENVIRONMENTAL CONDITIONS			ESTIMATED COST		OPERATING DUTY				
SPECIAL MATERIALS, CONSTRUCTION DETAILS									
ACCESSORIES (with equipment numbers, where applicable):									
						MOTOR CONTROL JOB STANDARD <input type="checkbox"/>			
						OR ALARM TO STATUS TO CONTROL FM	LOC	PCC	MCC
MANUFACTURER/REP/PHONE NUMBER Bradley			CATALOG OR MODEL NO. S19-310SPR			ESSENTIAL BUS YES <input type="checkbox"/> NO <input type="checkbox"/> PRIORITY 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/>			
MOTOR	HP	RPM	VOLTS	PHASE	TYPE	ENCLOSURE			
CONTROL									
OPERATION		DESCRIPTION OF OPERATION:							
JOB NO. 113787		BY: KLK	SUBJECT: eyewash			DATE: 10/22/12	SHEET: 1		
							REVISED:		
							REVISED:		



S19-310LL, S19-310SPR, S19-310UU Combination Drench Shower/Eyewash Unit

- Complies with American National Standard Z358.1
- Galvanized Steel Protected with BradTect® Safety Yellow Coating
- Combination Units may be Top-Supplied or Mid-Supplied
- Universal Identification Sign and Inspection Tag Included
- Full, One-Year Warranty
- Patent Pending
- Classified by Underwriters Laboratory Inc. to ANSI Z358.1



Specifications

Combination Drench Shower/Eyewash Unit saves space and fits easily into any work environment. Shower valve operates quickly by a pull rod with a triangular handle. Shower provides a superior washdown with a more even spray pattern. Eyewash operated by a large, highly visible push handle. Safe, steady water flow under varying water supply conditions from 30–90 PSI is assured by integral flow control in the sprayhead assembly. **NOTE:** The ANSI Z358.1 standard requires an uninterrupted supply of flushing fluid at a minimum 30 PSI flowing pressure.

- ☒ This plumbing fixture is not intended to dispense water for human consumption through drinking or for preparation of food or beverages.
- ☒ Local codes may require the installation of a backflow prevention valve to complete proper installation. Compliance with local codes is the responsibility of the installer. Valve must be tested annually to verify that it is functioning properly. Backflow prevention valves are not included with the fixture and may be supplied by the contractor or purchased from Bradley Corporation.

Model	Description
<input type="checkbox"/> S19-310LL	Drench Shower/Eyewash - Plastic Showerhead and Stainless Steel Bowl
<input checked="" type="checkbox"/> S19-310SPR	Drench Shower/Eye/Face Wash w/Face Spray Ring - Stainless Steel Showerhead and Bowl
<input type="checkbox"/> S19-310UU	Drench Shower/Eyewash - Stainless Steel Showerhead and Bowl
<input type="checkbox"/> S19-2100	Navigator EFX25 - Emergency Thermostatic Mixing Valve

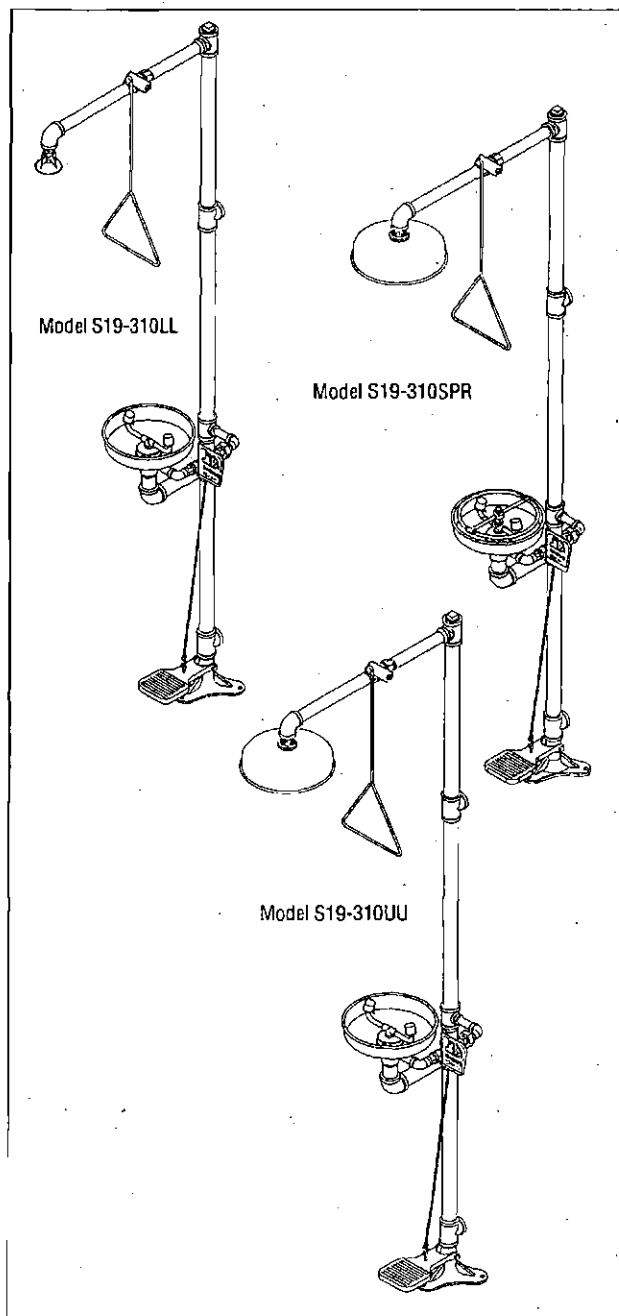
Recommended Option:

Navigator S19-2100 EFX25
Emergency Thermostatic Mixing Valve

NAVIGATOR



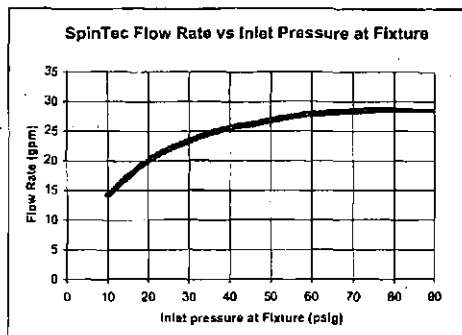
Satisfies ANSI Z358.1
tepid water requirements.



Standard Equipment

SpinTec™ Showerhead

3.1" (78.7mm) diameter highly visible yellow impact-resistant plastic includes 10 $\frac{3}{4}$ " (273mm) diameter corrosion-resistant stainless steel shroud. High performance stainless steel showerhead is type 316 corrosion-resistant. SpinTec drench showerhead features integral 26 GPM flow control, conserving water and helping to accurately size your tepid water system.



Eyewash Bowl

10 $\frac{3}{4}$ " (273mm) diameter corrosion-resistant stainless steel.

Standard Sprayhead Assembly

Chrome-plated brass sprayhead with twin soft-flow eyewash heads and protective sprayhead covers. Safe, steady water flow under varying water supply conditions from 30-90 PSI is assured by integral flow control in the sprayhead assembly.

Shower Valve

Chrome-plated brass 1" NPT stay-open ball valve. Operated by a stainless steel pull rod with triangular handle.

Eyewash Valve

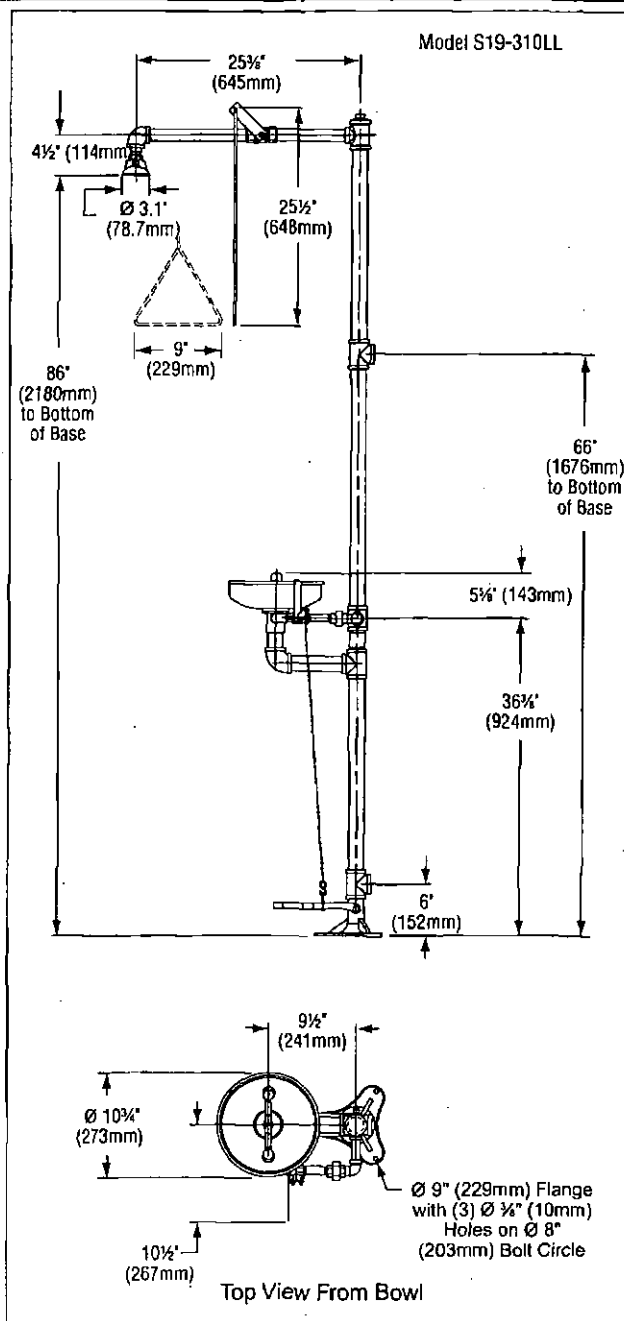
Chrome-plated brass $\frac{1}{2}$ " NPT stay-open ball valve. Hand operated by highly visible stainless steel push handle or foot valve.

Pipe and Fittings

1 $\frac{1}{4}$ " galvanized steel with BradTect® safety yellow coating.

Water Supply

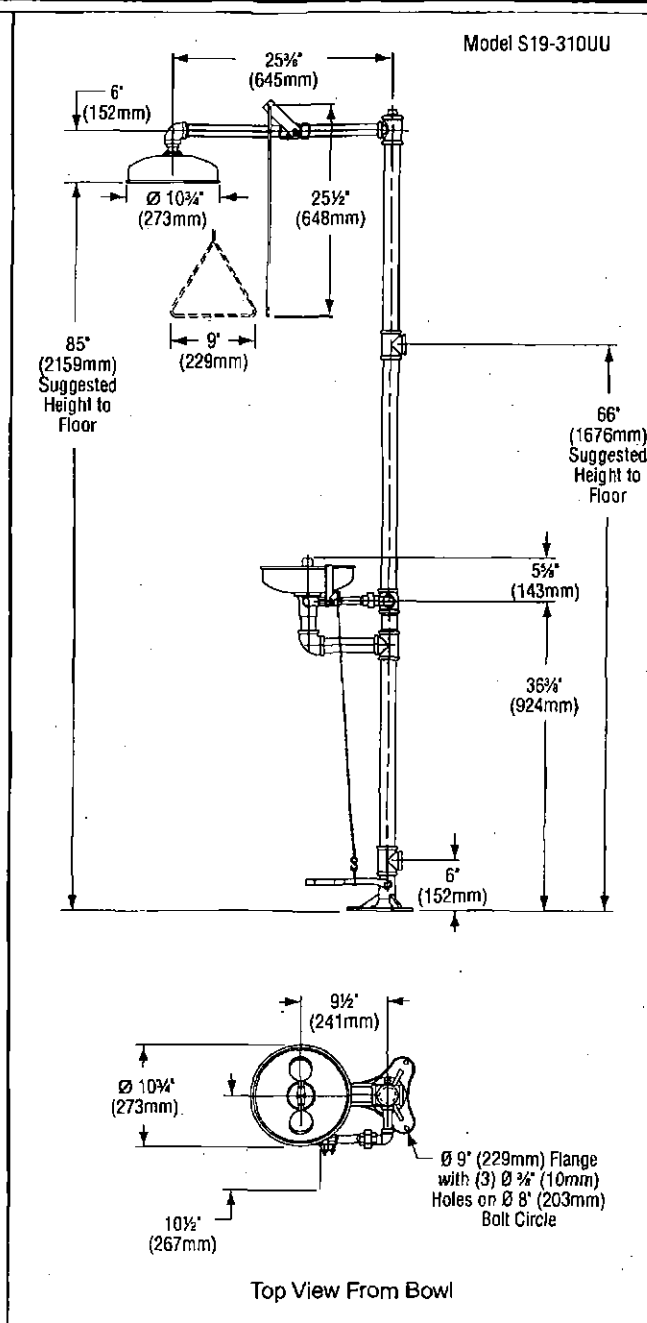
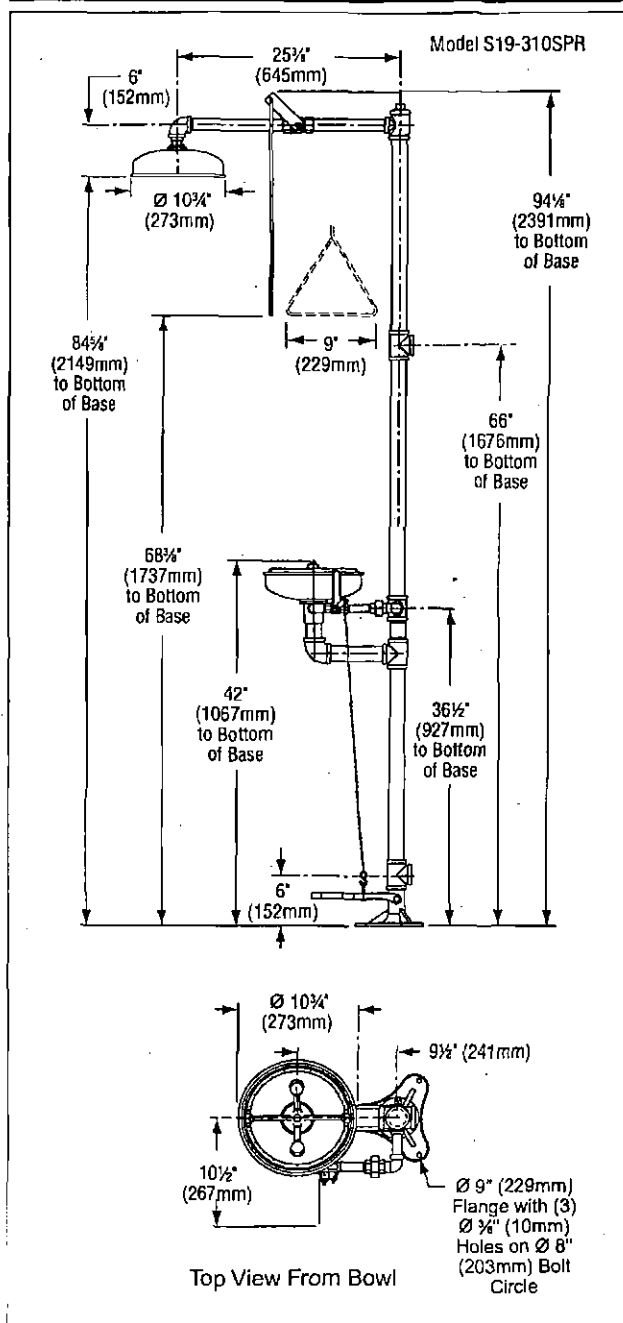
1 $\frac{1}{4}$ " NPT.



All dimensions assume standard thread engagement. Variations in manufacturing allow for $\pm \frac{1}{8}$ " (3mm) per threaded joint. To find the tolerance of a dimension, add the number of thread joints in between a dimension and multiply it by $\frac{1}{8}$ " (3mm).



S19-310LL, S19-310SPR, S19-310UU Combination Drench Shower/Eyewash Unit



All dimensions assume standard thread engagement. Variations in manufacturing allow for +/- 1/8" (3mm) per threaded joint. To find the tolerance of a dimension, add the number of thread joints in between a dimension and multiply it by 1/8" (3mm).

Emergency Fixtures
Document No. 4600

Page 3 of 3
This information is subject to change without notice.
2/10/2012

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P.O. Box 309, Menomonee Falls, WI 53052-0309
Phone: 800.BRADLEY (800.272.3539) Fax: 262.251.5817
bradleycorp.com

NAME (for nameplate) Ferric chloride Chemical Storage Tank		LOCATION Outside			EQUIPMENT NO.	
NO. OF UNITS (initial/ultimate) 1		RATED CONDITIONS & SIZE 540 gallon		OPERATING SPEED		WEIGHT
ENVIRONMENTAL CONDITIONS Interior Exterior		ESTIMATED COST		OPERATING DUTY continuous		
SPECIAL MATERIALS, CONSTRUCTION DETAILS Polypropylene						
ACCESSORIES (with equipment numbers, where applicable): Ferric chloride Feed System. Draw chemical from storage tank. Pump into the force main in vault.						
				MOTOR CONTROL JOB STANDARD <input type="checkbox"/>		
				OR ALARM TO STATUS TO CONTROL FM		
				LOC	PCC	MCC
MANUFACTURER/REP/PHONE NUMBER PolyProcessing Co LLC			CATALOG OR MODEL NO. 540 gallon upright tank		ESSENTIAL BUS YES <input type="checkbox"/> NO PRIORITY 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/>	
MOTOR	HP	RPM	VOLTS	PHASE	TYPE	ENCLOSURE
CONTROL						
OPERATION DESCRIPTION OF OPERATION: holds 40 day supply .						
JOB NO. 113787	BY: KLK	SUBJECT: ferric chloride Storage Tank			DATE: 10/23/2012	SHEET: 1
						REVISED:
						REVISED:

CHEMICAL RESISTANCE GUIDE

CHEMICAL	RESIN TYPE	SPECIFIC GRAVITY RATING	FITTING MATERIAL	GASKET MATERIAL	BOLT MATERIAL
Acetic Acid \leq 80%	XLPE	1.9	PP	EPDM	316SS
Aluminum Sulfate	XLPE	1.65	PVC/CPVC	EPDM	316SS
Calcium Carbonate	XLPE	1.9	PVC/CPVC	EPDM	316SS
Calcium Chloride	XLPE	1.65	PVC/CPVC	EPDM	Titanium
Citric Acid	XLPE	1.65	PVC/CPVC	EPDM	316SS
Deionized Water	XLPE	1.65	PVC/CPVC	EPDM	316SS
Ethylene Glycol	XLPE	1.35	PVC/CPVC	EPDM	316SS
Ferric Chloride	XLPE	1.65	PVC/CPVC	EPDM	Titanium
Ferric Sulfate	XLPE	1.65	PVC/CPVC	EPDM	Titanium
Ferrous Chloride	XLPE	1.9	PVC/CPVC	EPDM	Titanium
Ferrous Sulfate	XLPE	1.65	PVC/CPVC	EPDM	Titanium
Hydrochloric Acid \leq 37%	XLPE with OR-1000™	1.9	PVC/CPVC	EPDM	C-276
Hydrofluoric Acid	XLPE	1.9	PP	Viton®	C-276
Hydrofluosilicic Acid	XLPE	1.9	PVC/CPVC	EPDM	C-276
Hydrogen Peroxide	XLPE	1.9	PVC/CPVC	Viton®	316SS
Magnesium Chloride 30%	XLPE	1.65	PVC/CPVC	EPDM	Titanium
Phosphoric Acid $>$ 50%	XLPE	1.9	PVC/CPVC	Viton®	C-276
Phosphoric Acid \leq 50%	XLPE	1.9	PVC/CPVC	Viton®	316SS
Potable Water	HDPE	1.35	PVC/CPVC	EPDM	316SS
Potassium Hydroxide	XLPE	1.9	PVC/CPVC	EPDM	C-276
Sodium Bisulfite	XLPE	1.65	PVC/CPVC	EPDM	316SS
Sodium Carbonate	XLPE	1.35	PVC/CPVC	EPDM	Titanium
Sodium Chlorite	XLPE	1.9	PVC/CPVC	Viton® GF	316SS
Sodium Hydroxide 50%	XLPE	1.65	PVC/CPVC	EPDM	316SS
Sodium Hypochlorite 2%–15%	XLPE with OR-1000™	1.9	PVC/CPVC	EPDM/Viton®	Titanium
Sodium Hypochlorite $<$ 2%	XLPE	1.35–1.9	PVC/CPVC	EPDM/Viton®	Titanium
Sulfuric Acid \geq 93%	XLPE with OR-1000™	2.2	PVC/CPVC	Viton®	316SS
Sulfuric Acid 80%–92%	XLPE with OR-1000™	2.2	PVC/CPVC	Viton®	C-276
Sulfuric Acid $<$ 80%	XLPE	1.9	PVC/CPVC	Viton®	C-276

For more resistance information, including details on other chemicals, visit www.polyprocessing.com and access our Chemical Resistance Online Guide.

Temperature: Product temperature is limited to 100 degrees F. For temperatures from 100 to 150 degrees F, contact Customer Service.

MATERIAL DESCRIPTIONS

Fitting materials:

- PP (Polypropylene) – light, durable pipe or fitting material with outstanding chemical resistance
- PVC (Polyvinyl Chloride) – stronger, more rigid pipe or fitting material with excellent chemical resistance
- CPVC (Chlorinated Polyvinyl Chloride) – stronger, more rigid pipe or fitting material with higher temperature rating

Gasket materials:

- EPDM (ethylene propylene diene monomer) – good abrasion and tear resistance with excellent chemical resistance
- Viton® (fluorocarbon) – broader temperature and chemical resistance
- Viton® GF/GORE-TEX® – highest temperature resistance

Bolt materials:

- 316SS (stainless steel type 316) – common alloy used in many storage applications
- Titanium – strong as steel, but half the weight
- C-276 (Alloy C-276) – broader chemical resistance for more difficult storage applications

PRE-PURCHASE GUIDE

Before Ordering:

1. Determine capacity and location restrictions, gallons, maximum height and diameter, and indoor or outdoor installation.
2. Conduct a chemical review: name, concentration, specific gravity and temperature.
3. See the chemical resistance guide (page 12) for tank and fittings materials, specific gravity rating, pneumatic or mechanical fill, and full drain and secondary containment requirements.
4. Use the complete 8-digit stock number when placing orders. Note: the first digit of each stock number indicates the manufacturing location: 4 - Monroe, LA; 7 - Winchester, VA; 1 - French Camp, CA.
5. Download a tank schematic from polyprocessing.com and use this drawing to specify the fitting locations.
6. Contact a Poly Processing distributor for details.

Operating Parameters

TEMPERATURE

- Tank specific gravity ratings are based on a product temperature of 100 degrees F.
- For tank designs for temperatures up to 150 degrees F, contact Customer Service.

PRESSURE

Atmospheric pressure must be maintained in the tank at all times; vacuum must equal zero.

VENTING

See chart on page 11.

PLUMBING

Requires use of flexible connections with fittings on lower third of sidewall.

HEAT MAINTENANCE CONTROLS

Two thermostats are furnished, one for control and one for redundancy; heating requirements vary depending on maintenance temperature, ambient temperature and wind conditions.

POLYURETHANE INSULATION WITH MASTIC COATING

- 2-inch nominal thickness
- R-value = 8.33/inch
- Density = 2 lbs./cubic foot
- Mastic coating is white acrylic vinyl.

TANK COLOR

- High-density crosslinked polyethylene (XLPE) - natural, black, white, gray.
- Linear polyethylene (HDPE) - natural, black.

NOTE: For additional colors, contact Customer Service.

TANK DOME LOAD RATING

DO NOT stand or work on tank domes. The surface is flexible and slippery. There is no weight or load rating for the dome.

GENERAL INFORMATION

- Nominal capacity = Calculated tank capacity to top of straight sidewall
- All vertical, IMFO® and SAFE-Tank® systems greater than 500 gallons are manufactured in accordance with ASTM D1998 standards.
- Gallonage markers are approximate; not for precise measuring or metering

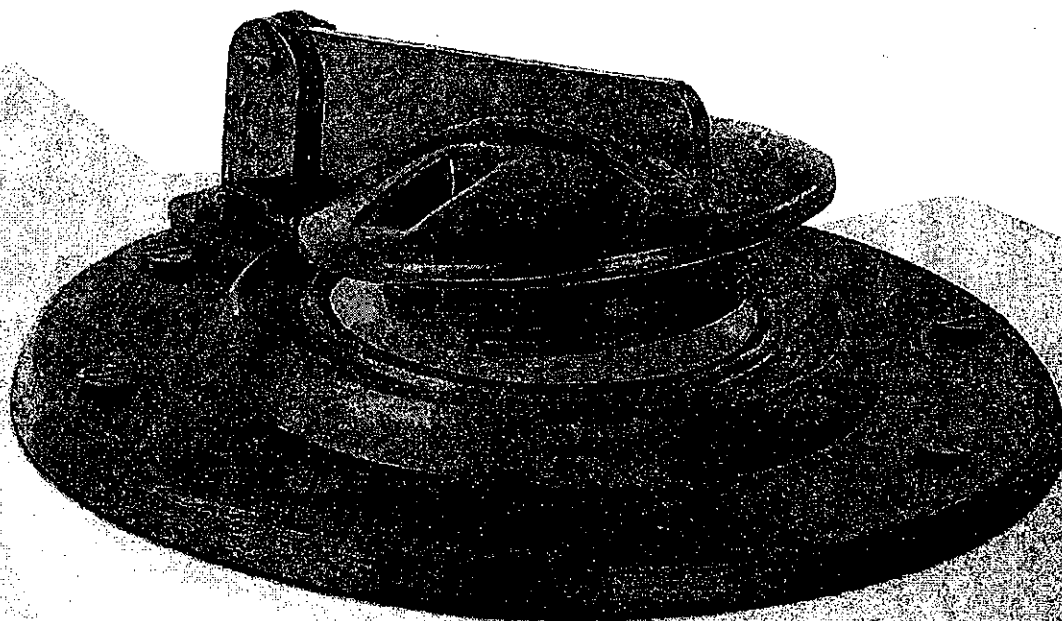
LOGISTICS

Delivery and shipping information is provided on the back cover.

VENTING REQUIREMENTS

VENTING REQUIREMENTS FOR POLYETHYLENE TANKS									
Mechanical Pump Fill	Pneumatic Fill								
IF \leq 1,000 gallons	IF – Vent length \leq 3'			IF – Vent length $>$ 3' and \leq 30'			IF – Scrubber application		
Vent size should equal size of largest fill or discharge fitting	AND – Vent screen mesh size \geq 1/4" or no screen used			AND – 3 or less 90° elbows with no other restrictions or reduction in pipe size			Vent pipe size throughout scrubber system CANNOT be reduced!		
							Centerline of dispersion pipe not to be submersed $>$ 6"		
IF $>$ 1,000 gallons	Emergency Pressure Relief Cover Required			Emergency Pressure Relief Cover Required			Perforated dispersion pipe must be same diameter as vent or larger. Sum of perforations \geq cross-sectional area of pipe		
Vent size should exceed the largest fill or discharge fitting by 1"	Tanker Discharge	Inlet/Fitting Size	Minimum Vent Size	Tanker Discharge	Inlet/Fitting Size	Minimum Vent Size	Tanker Discharge	Inlet/Fitting Size	Minimum Vent Size
	2"	2"	4"	2"	2"	6"	2"	2"	6"
	3"	2"	6"	3"	2"	6"	3"	2"	8"
	3"	3"	6"	3"	3"	8"	3"	3"	10"

** See our website for Detailed Venting Guidelines.



△ PVC FLOAT TYPE SIGHT GAGE
PPC STOCK # 4089 FOR VERTICAL
TANKS UNDER 7 FEET TALL
PPC STOCK # 3356 FOR VERTICAL
TANKS OVER 7 FEET TALL

△

PIPE SUPPORT PPC STOCK NOS.		
BOLT TYPE	EXTERIOR ONLY	INTERIOR/EXTERIOR
316SS	3198	3198
ALLOY 400	3201	3201
TITANIUM	3204	3204
ALLOY C-276	3207	3207
GASKET PPC STOCK NOS.		
EPDM	XLPE	BUNA/VITON/ORE-TEX
3209	2751	2752/2759/2766

2"/SCH 80 PIPE/
BLACK/PE--WELD
TO PLATE & STUD

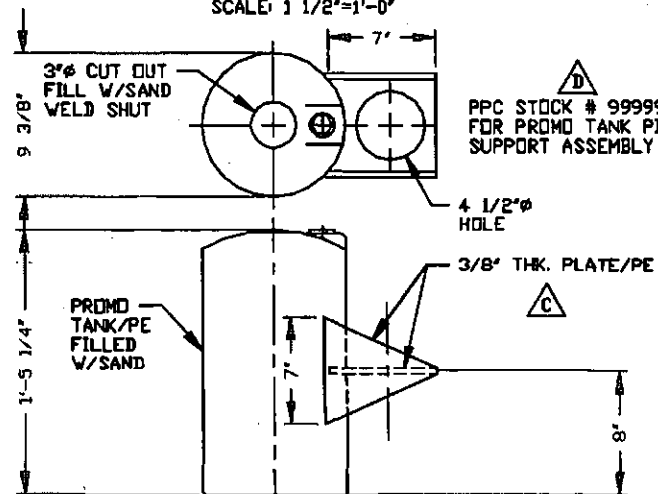
1/8" THK. X 2"
FB/304SS
"J" BRACKET
TO HAVE (2) 4" LG.
LEG & (1) 2" LG. LEG
2" LG. LEG TO HAVE
17/32" HOLE

1/2-13 STUD/316SS
W/LOCK, WASHER & (3) NUTS
W/PE ENCAPSULATED HEAD
W/(2) GASKET/EPDM
W/PE WASHER

3/8" THK. X 9" X 7"
BLACK PE PLATE W/
4 1/2" HOLE

TO BE USED ONLY WHEN FITTING HAS OPTIONAL PIPING ON THE INSIDE OF THE
TANK. PROMD TANK PIPE SUPPORT REQ'D FOR PIPING INSIDE SAFE-TANK ASSEMBLIES.

PIPE SUPPORT
SCALE: 1 1/2"=1'-0"



△
PPC STOCK # 99999999
FOR PROMD TANK PIPE
SUPPORT ASSEMBLY

PROMD TANK PIPE SUPPORT
SCALE: 1 1/2"=1'-0"

WHEN PROMD TANK PIPE SUPPORT IS USED INSIDE PIPING WILL BE SHIPPED LOOSE.

- NOTES
1. THIS IS A COMPUTER GENERATED DWG. DO NOT REVISE BY HAND.
 2. COMPUTER DRAWING NAME "FTSGA,"=SHEET 1, "FTSGB,"=SHEET 2, "FTSGC,"=SHEET 3.
 3. THIS DRAWING REPLACES DRAWING NO. PPC071585-1, TITLE, "FLOAT TYPE SIGHT GAGE."

DWG TITLE
FLOAT TYPE SIGHT GAGE

SCALE: NONE
DATE: 4-11-96
DR. D. RECTOR
OK E.T./V.T.
SHEET: 1 OF 3
PPC041196-1 D

2"/SCH 40 PIPE
PVC/CUT TO FIT

2"/SCH 80 PIPE/
PVC/TH'D (1) END

FITTING AS REQUIRED
FOR TANK APPLICATION
(2" UNIVERSAL BALL
DOME FTG. SHOWN)

2"/SCH 80 PIPE/
PVC/TH'D AS REQ'D.
OPTIONAL

3" X 2"/SCH 80
REDUCER BUSHING/PVC
OPTIONAL

4" X 3"/REDUCER
COUPLING/PVC
OPTIONAL

4"/PERFORATED
SEWER PIPE/PVC
OPTIONAL

OPTIONAL INTERNAL PIPING NOT
AVAILABLE ON TANKS WITH LESS
THAN 19" MANWAYS. OPTIONAL
INTERNAL PIPING MAY BE OMITTED
BY CUSTOMER ON ANY TANK.

1/8" DIA ROPE/
TWISTED YELLOW
POLYPROPYLENE

PIPE SUPPORT
SEE DETAIL

PROMD TANK PIPE SUPPORT
SEE DETAIL
REQ'D FOR PIPING INSIDE
SAFE-TANK ASSEMBLIES
MAY BE USED ON ANY TANK
AS REQ'D BY CUSTOMER

LEVEL INDICATOR
SEE DETAIL

2"/SCH 40 CLEAR
TUBE/PVC

NOTE: DO NOT MAKE ANY
PERMANENT CONNECTIONS
ON PIPE FITTINGS UNLESS
SPECIFIED ON DRAWING

FLOAT
SEE DETAIL

2"/SCH 40
PIPE CAP/
PVC
OR OPTIONAL
CPLG. & PLATE
SEE DETAIL

APPROX. 3'-0"

LEAVE 1/4"-1/2" PLAY

ASSEMBLY DETAIL
SCALE: 3/4"=1'-0"

LEAVE 1/4"-1/2" PLAY

NAME (for nameplate) Pressure Gauges/Sensors			LOCATION (structure, area) Force main in vault			EQUIPMENT NO.			
NO. OF UNITS (initial/ultimate) 2/2			RATED CONDITIONS & SIZE 4"			OPERATING SPEED NA		WEIGHT	
ENVIRONMENTAL CONDITIONS EXPOSED (Above Ground)			ESTIMATED COST		OPERATING DUTY (continuous, 50%, etc.) Intermittent				
SPECIAL MATERIALS, CONSTRUCTION DETAILS Gauge: 2-1/2" Stainless steel spring; suspended movement: Polished case; frictional adjustable pointers; liquid filled case; AISI 316 or Stainless steel socket.									
ACCESSORIES (with equipment numbers, where applicable):									
Optional (glycerin filled standard)						MOTOR CONTROL			
						JOB STANDARD 9			
						OR ALARM TO STATUS TO CONTROL FM	LOC	PCC	MCC
MANUFACTURER/REP/PHONE NUMBER Red Valve			CATALOG OR MODEL NO. Series 40			ESSENTIAL BUS YES 9 NO 9 PRIORITY 1 9 2 9 3 9			
M O T O R	HP NA	RPM NA	VOLTS NA	PHASE NA	TYPE (ind., Synch., etc.) NA		ENCLOSURE (ODP, TEFC, etc.) NA		
C O N T R O L	EMERGENCY INTERLOCKS (overpressure, temperature, limit switches, etc.)								
O P E R A T I O N	DESCRIPTION OF OPERATION (use additional sheets as required) Measure system pressure at various intervals.								
JOB NO. I13787		BY: KLK		SUBJECT: Pressure sensor		DATE: 5/1/13		SHEET:	
								REVISED:	
								REVISED:	

Series 40

- ▶ Protects and isolates instrumentation
- ▶ Full 360° pressure reading
- ▶ Self-cleaning, flexing action
- ▶ Won't clog like traditional diaphragm seals
- ▶ Excellent pump protection



Materials of Construction

- ▶ Carbon Steel Body – Non-wetted
- ▶ ANSI B16.5 Class 150 Flanges in Carbon Steel, 316 Stainless Steel, PVC, or Teflon® Coated Carbon Steel
- ▶ Sleeves Available in Pure Gum Rubber, Neoprene, Chlorobutyl, Buna-N, Hypalon®, Viton®, EPDM, White Food Grade Elastomers, Teflon® coated Buna-N, or Teflon® coated Viton®
- ▶ Fill Fluid; Ethylene Glycol & Water (200° F), Vegetable Oil (230° F), Silicone Oil (400° F)

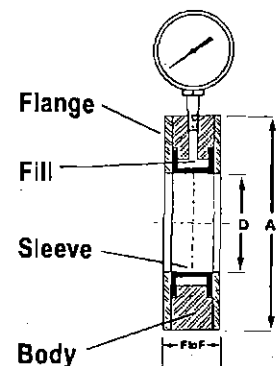
Red Valve Series 40 and Series 42 Pressure Sensors are the industry standards for protecting instrumentation, and assuring accurate, dependable pressure measurement of slurry and corrosive fluids.

The line pressure is sensed 360° through the flexible rubber sleeve. The captive fluid is displaced through the pressure sensor body to the instrument's Bourdon tube. All instruments are isolated and protected from the process, assuring positive and accurate readings.

The full-faced, thru-bolted Series 40 installs directly in-line. Costly installation and maintenance of pipe stands and saddle welds, which are required when installing antiquated diaphragm seals, are eliminated.

The thru-bolted Series 40 can be mounted in any flow direction, submerged in a tank, or mounted with a blind flange as a dead end to monitor tank levels.

The Red Valve standard gauge is bottom mounted, with a 2½" diameter steel case; accuracy of this gauge is ±1% of the gauge reading. A 0 – 100 psi gauge is furnished as standard unless otherwise specified. 0 – 200 psi gauges are optional at no additional cost. All Red Valve Pressure Sensors and gauges are tested and calibrated through the mid-range to assure the highest level of accuracy. Pressure gauges, transmitters, transducers, recorders, differential pressure or vacuum switches are factory filled and mounted to the Series 40.



DIMENSIONS SERIES 40

Size D	Outside Diameter A	Length F to F	100°F Working Pressure (psi) *	Weight (lbs)
1"	4½"	1⅞"	275	6
1½"	5"	1⅞"	275	8
2"	6"	1⅞"	275	12
2½"	7"	1⅞"	275	16
3"	7½"	1⅞"	275	18
4"	9"	2⅞"	275	27
5"	10"	2¼"	275	32
6"	11"	2¼"	275	37
8"	13½"	2½"	275	58

* PVC Unit has Working Pressure of 200 psi; Higher Working Pressure Available.

NAME (for nameplate) Check Valve		LOCATION wastewater pump station # 47		EQUIPMENT NO.																		
NO. OF UNITS (initial/ultimate) 2/2		RATED CONDITIONS & SIZE 4 inch		OPERATING SPEED WEIGHT																		
ENVIRONMENTAL CONDITIONS Valve vault, outside		ESTIMATED COST		OPERATING DUTY (continuous, 50%, etc.)																		
SPECIAL MATERIALS, CONSTRUCTION DETAILS																						
ACCESSORIES (with equipment numbers, where applicable):																						
<table border="1"> <tr> <td colspan="4">MOTOR CONTROL JOB STANDARD <input type="checkbox"/></td> </tr> <tr> <td rowspan="4">OR ALARM TO STATUS TO CONTROL FM</td> <td>LOC</td> <td>PCC</td> <td>MCC</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>						MOTOR CONTROL JOB STANDARD <input type="checkbox"/>				OR ALARM TO STATUS TO CONTROL FM	LOC	PCC	MCC									
MOTOR CONTROL JOB STANDARD <input type="checkbox"/>																						
OR ALARM TO STATUS TO CONTROL FM	LOC	PCC	MCC																			
MANUFACTURER/REP/PHONE NUMBER Flygt / Ed Martin -- James, Cook, Hobson, Inc		CATALOG OR MODEL NO. Type 5087		ESSENTIAL BUS YES <input type="checkbox"/> NO <input type="checkbox"/> PRIORITY 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/>																		
MOTOR	HP	RPM	VOLTS	PHASE	TYPE (induction, Synchronous, etc.)																	
CONTROL		EMERGENCY INTERLOCKS (overpressure, temperature, limit switches, etc.)																				
OPERATION		DESCRIPTION OF OPERATION (use additional sheets as required)																				
JOB NO. 113787	BY: KK	SUBJECT: Check Valve		DATE: 4/20/2012	SHEET: 1 REVISED: REVISED:																	

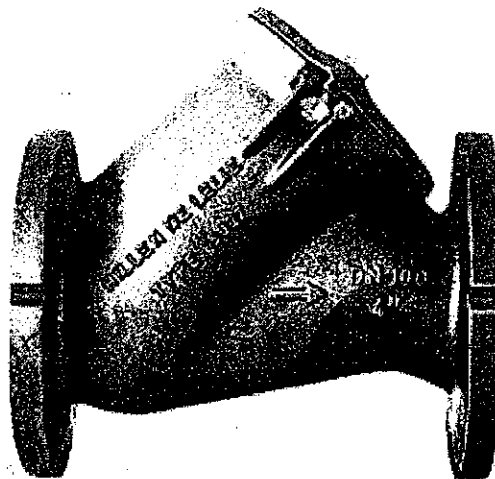
Accessories - ITT W&WW HDL Ball Check Valves (Type 5087)

HDL ball check valves offer great operational reliability, high quality and are virtually maintenance free.

- Reliable, silent operation without clogging.
- Efficient operation even with small pressure differences.
- No wear under normal conditions.
- Maintenance-free and long life
- Metal ball is covered with an oil, sewage and sea water resistant rubber for perfect sealing.

Design features

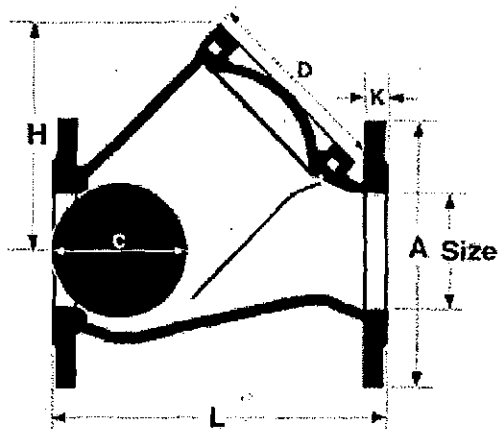
- Clog-free design based on the principle of a freely moving ball mounted in a valve housing in such a way that return flow is effectively prevented.
- Valve housing is constructed of a high quality nodular cast iron type GGG40.
- Short valve length.
- Light weight.
- Low friction losses.
- Available in sizes 2" to 14"
- Standard model handles working pressures of up to 145 psi.
- Standard model handles working temperatures of up to 176° F.
- Valve assembly is easily serviced.



Applications:

The model 5087 is ideal for use in systems where there is danger of clogging, such as sewage and storm water systems.

Size		A		C		D		H		K		L		Weight	
mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	kg	lb.
50	2	152	5 15/16	63	2 1/2	100	4	115	4 7/16	16	11/16	203	8	9	20
80	3	191	7 1/2	96	3 3/4	140	5 1/2	160	6 1/4	19	3/4	241	9 1/2	13	29
100	4	229	9	125	4 15/16	170	6 11/16	200	7 7/8	19	3/4	292	11 1/2	20	44
150	6	279	11	180	7 1/16	230	9 1/16	260	10 3/16	16	11/16	356	14	42	93
200	8	343	13 1/2	250	9 7/8	315	12 3/8	335	13 3/16	20		495	19 1/2	74	163
250	10	406	16	320	12 5/8	396	15 5/8	410		22	13/16	622	24 1/2	138	304
300	12	483	19	370	14 9/16	460	18 1/8	490	16 1/8	24.5	7/8	699	27 9/16	200	441
350	14	533	21	440	17 5/16	544	21 1/2	590	19 5/16 23 3/16	24.5	15/16 15/16	787	31	310	683



Project	Project ID	Created by	Created on	Last update
			2015-05-21	

NP 3127 SH 3~ 248

Performance curve



Pump

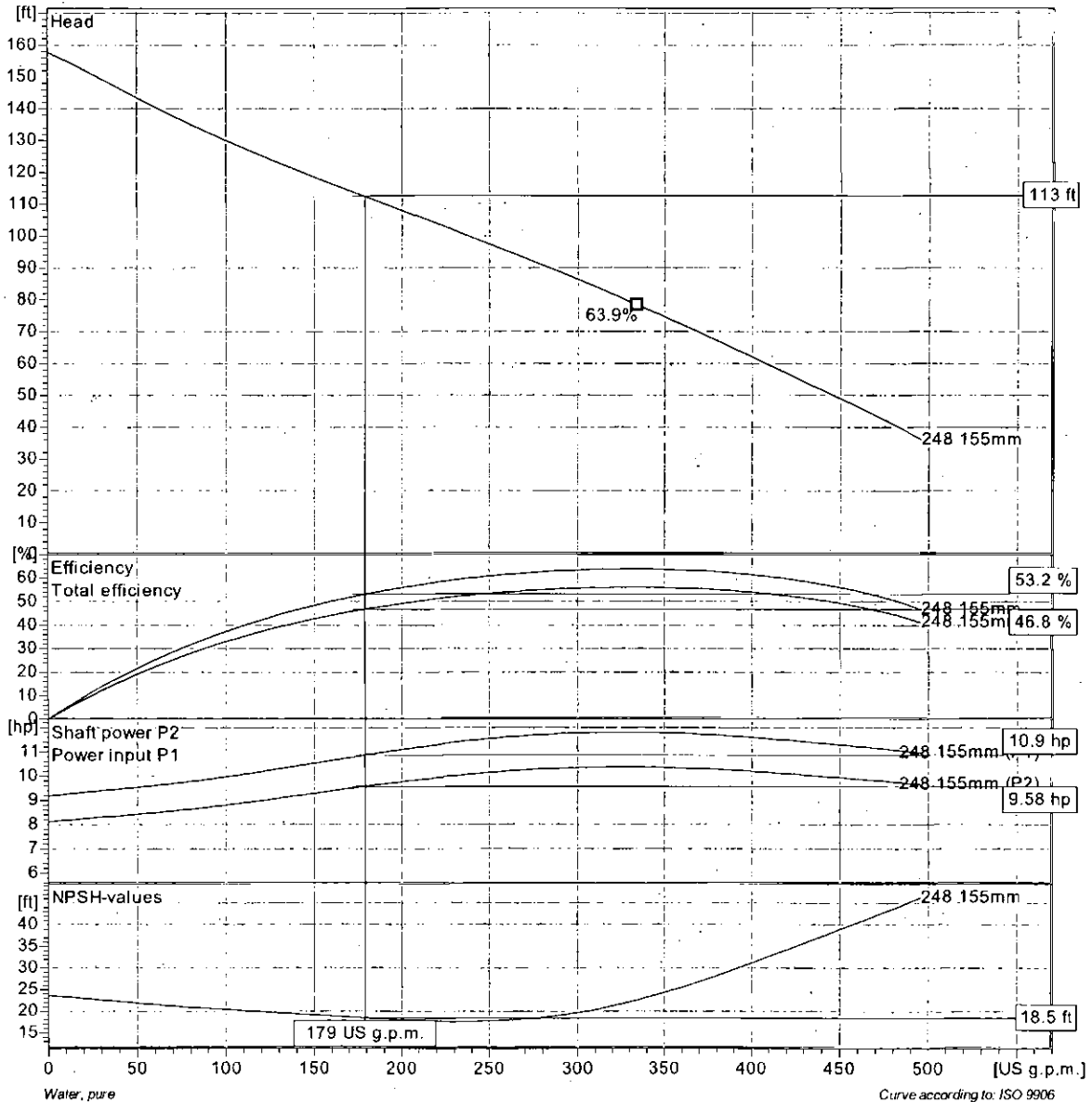
Discharge Flange Diameter 3 1/8 inch
Suction Flange Diameter 80 mm
Impeller diameter 6 1/8"
Number of blades 2

Motor

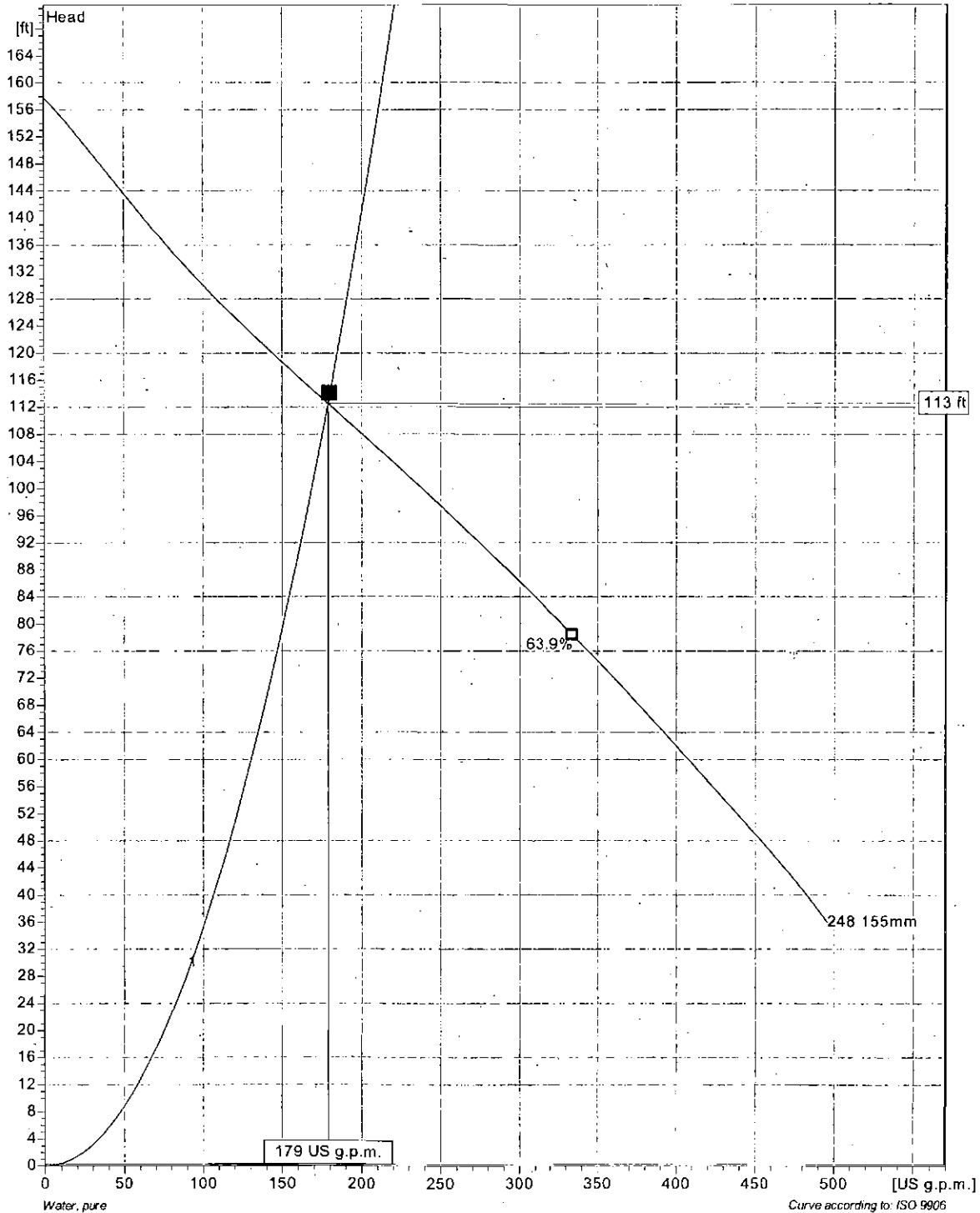
Motor # N3127.185 21-11-2AL-W 11hp
Stator variant 12
Frequency 60 Hz
Rated voltage 460 V
Number of poles 2
Phases 3~
Rated power 11 hp
Rated current 13 A
Starting current 110 A
Rated speed 3495 rpm

Power factor
1/1 Load 0.92
3/4 Load 0.90
1/2 Load 0.85

Efficiency
1/1 Load 87.6 %
3/4 Load 88.4 %
1/2 Load 87.7 %



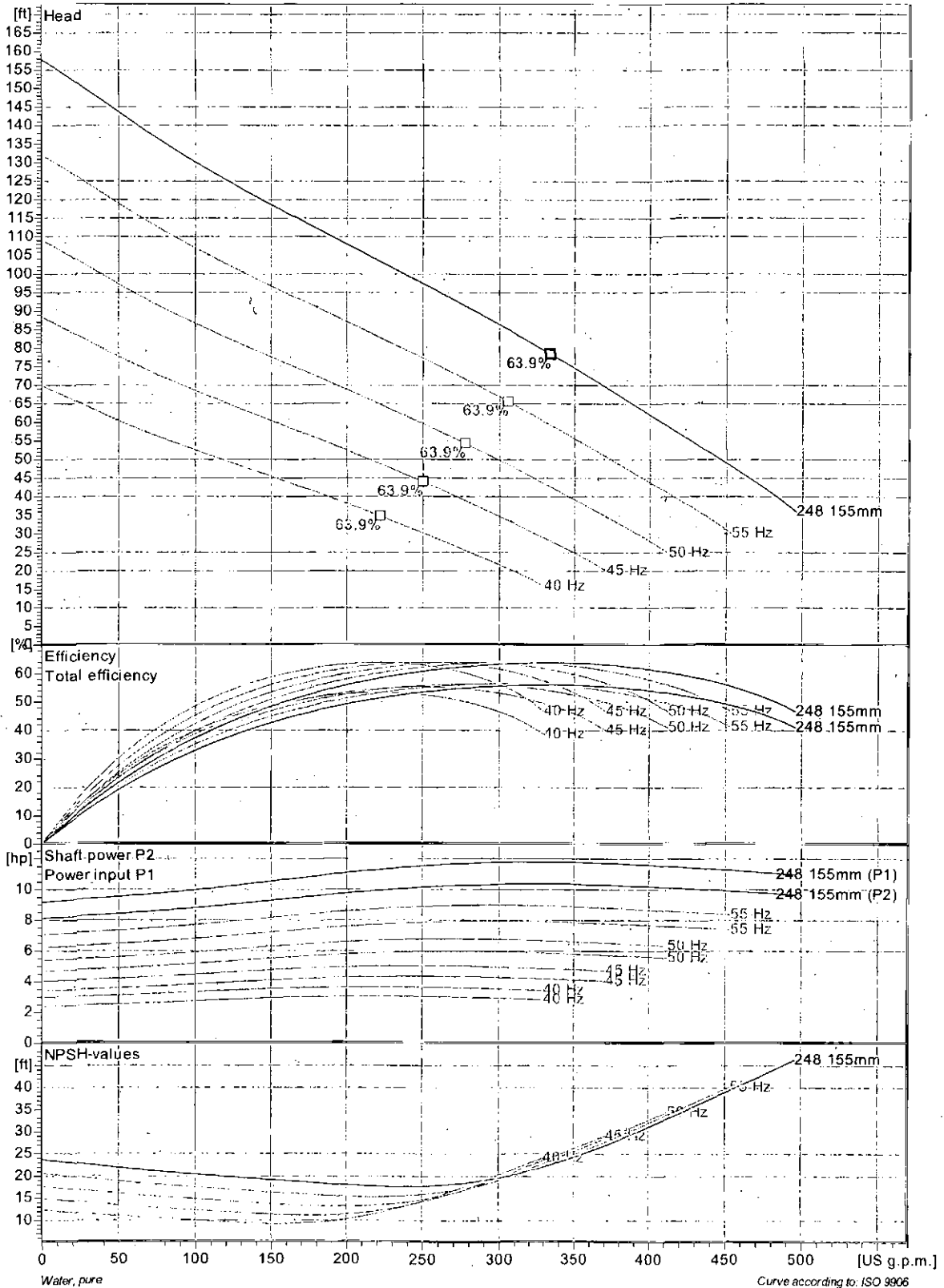
NP 3127 SH 3~ 248
Duty Analysis



Pumps running /System	Individual pump			Total					Specific energy	NPSH _{re}
	Flow	Head	Shaft power	Flow	Head	Shaft power	Pump eff.			
1	179 US g.p.m.	113 ft	9.58 hp	179 US g.p.m.	113 ft	9.58 hp	53.2 %	755 kWh/US MG		18.5 ft

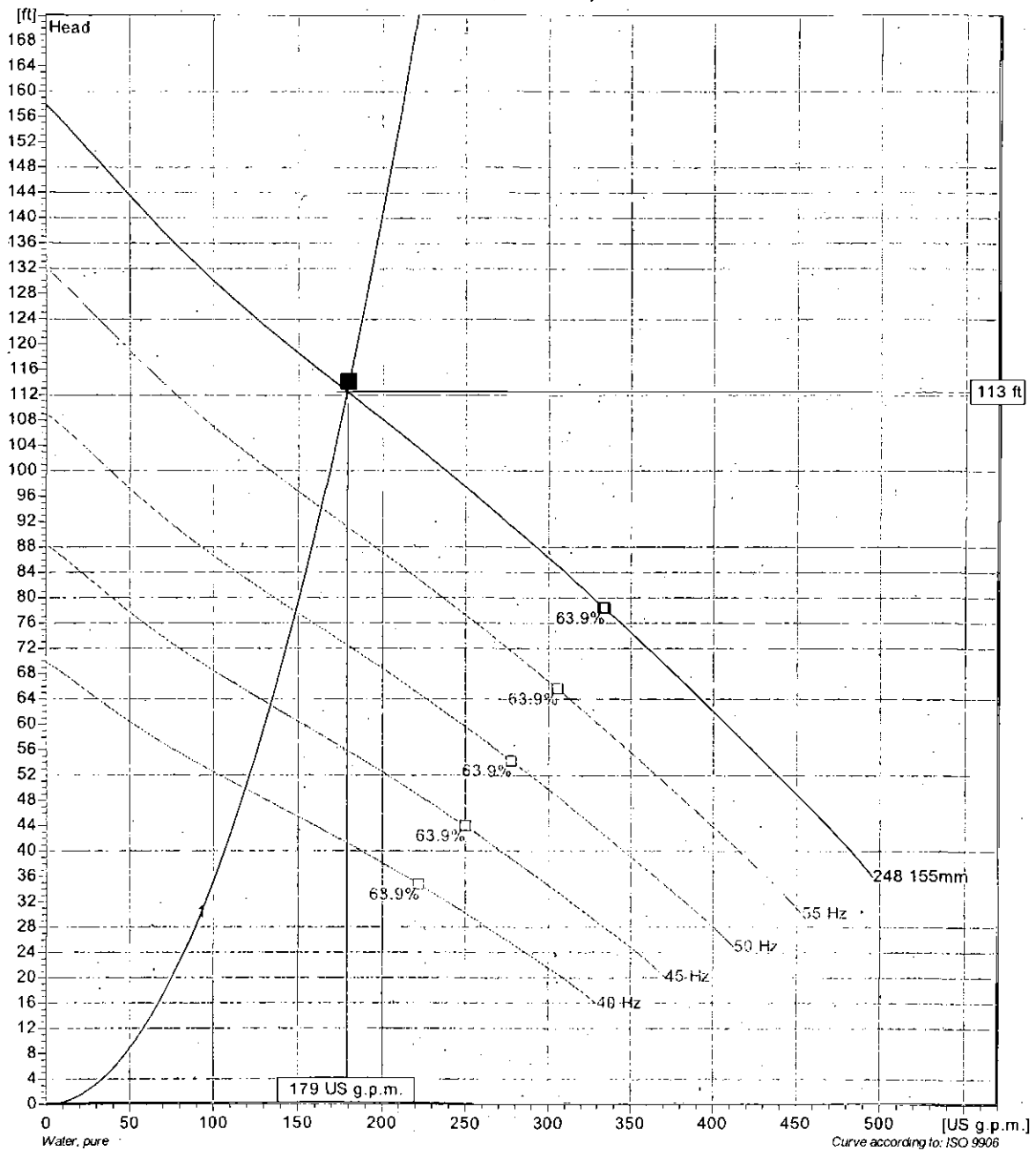
Project	Project-ID	Created by	Created on	Last update
			2015-05-21	

NP 3127 SH 3~ 248
VFD Curve



Project	Project ID	Created by	Created on	Last update
			2015-05-21	

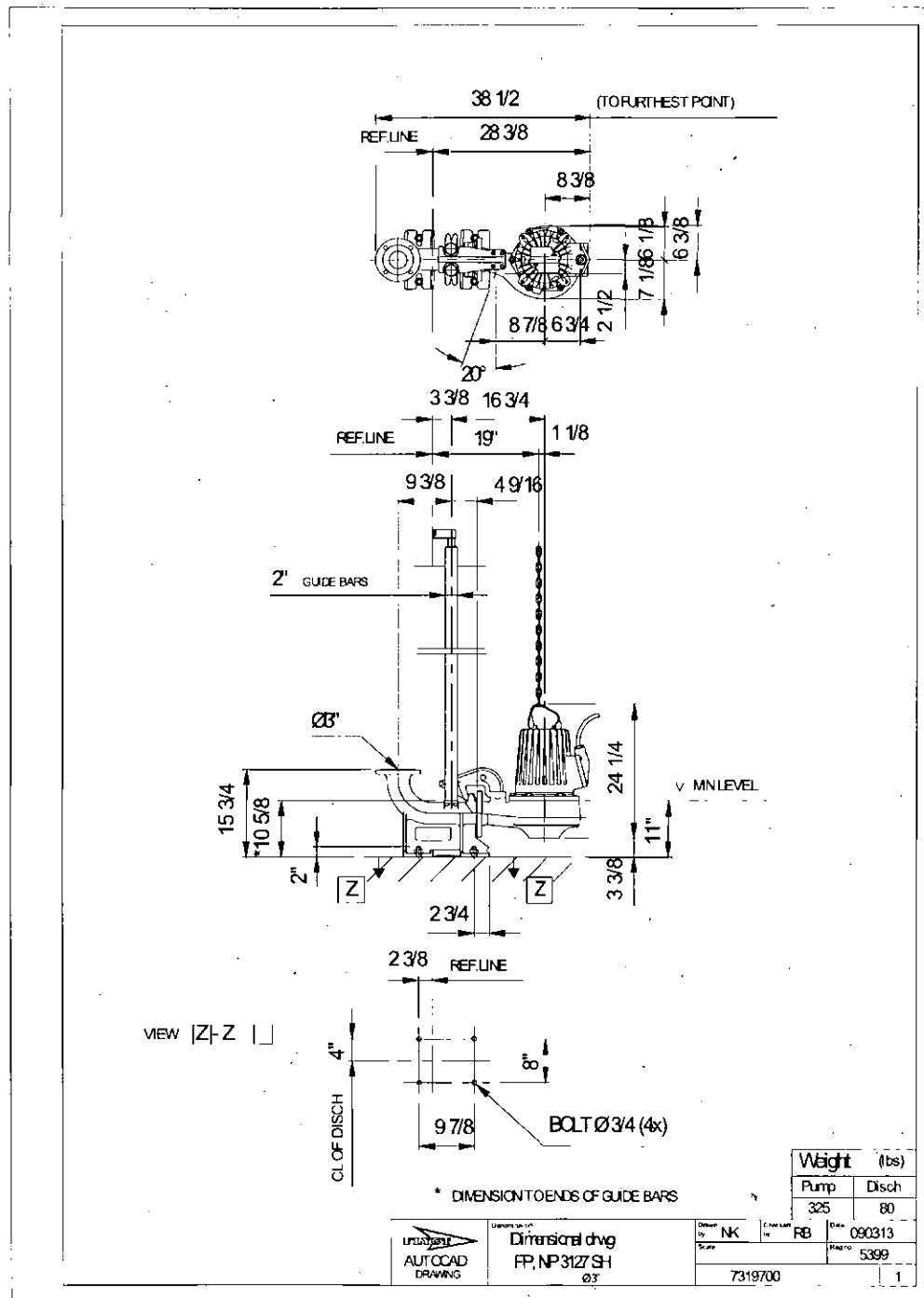
NP 3127 SH 3~ 248
VFD Analysis



Individual pump					Total				
Pumps running /System	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hyd. eff.	Specific energy
1	60 Hz	179 US g.p.m.	113 ft	9.58 hp	179 US g.p.m.	113 ft	9.58 hp	53.2%	755 kWh/US MG 18.5 ft
1	55 Hz	164 US g.p.m.	94.2 ft	7.33 hp	164 US g.p.m.	94.2 ft	7.33 hp	53.2%	630 kWh/US MG 16 ft
1	50 Hz	149 US g.p.m.	77.8 ft	5.51 hp	149 US g.p.m.	77.8 ft	5.51 hp	53.2%	525 kWh/US MG 13.7 ft
1	45 Hz	134 US g.p.m.	63 ft	4.01 hp	134 US g.p.m.	63 ft	4.01 hp	53.2%	434 kWh/US MG 11.6 ft
1	40 Hz	119 US g.p.m.	49.8 ft	2.82 hp	119 US g.p.m.	49.8 ft	2.82 hp	53.2%	357 kWh/US MG 9.62 ft

Project	Project ID	Created by	Created on	Last update
			2015-05-21	

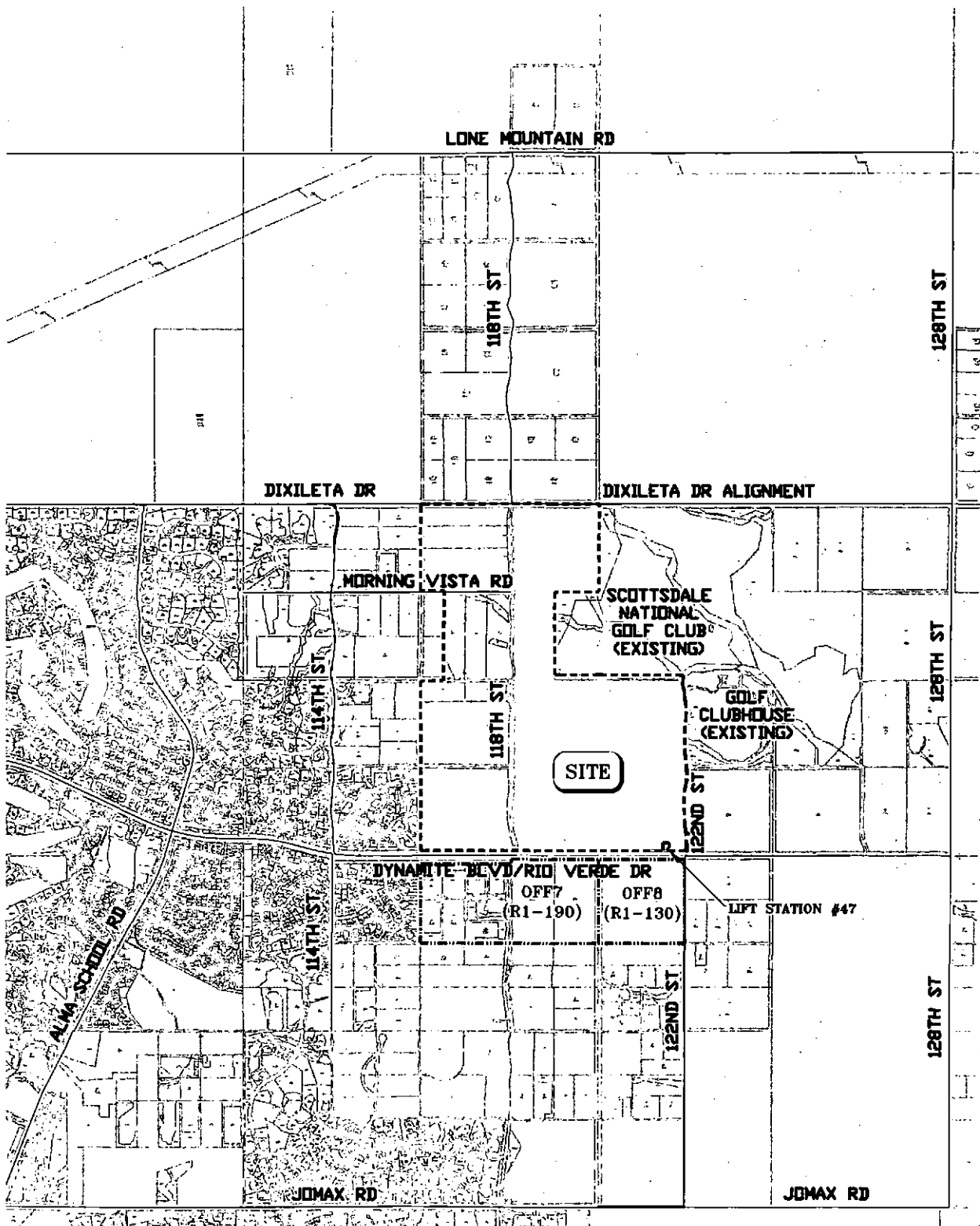
NP 3127 SH 3~ 248
Dimensional drawing



Project	Project ID	Created by	Created on	Last update
			2015-05-21	

FIGURE 1

Vicinity Map and Wastewater Service Area



----- Property Boundary

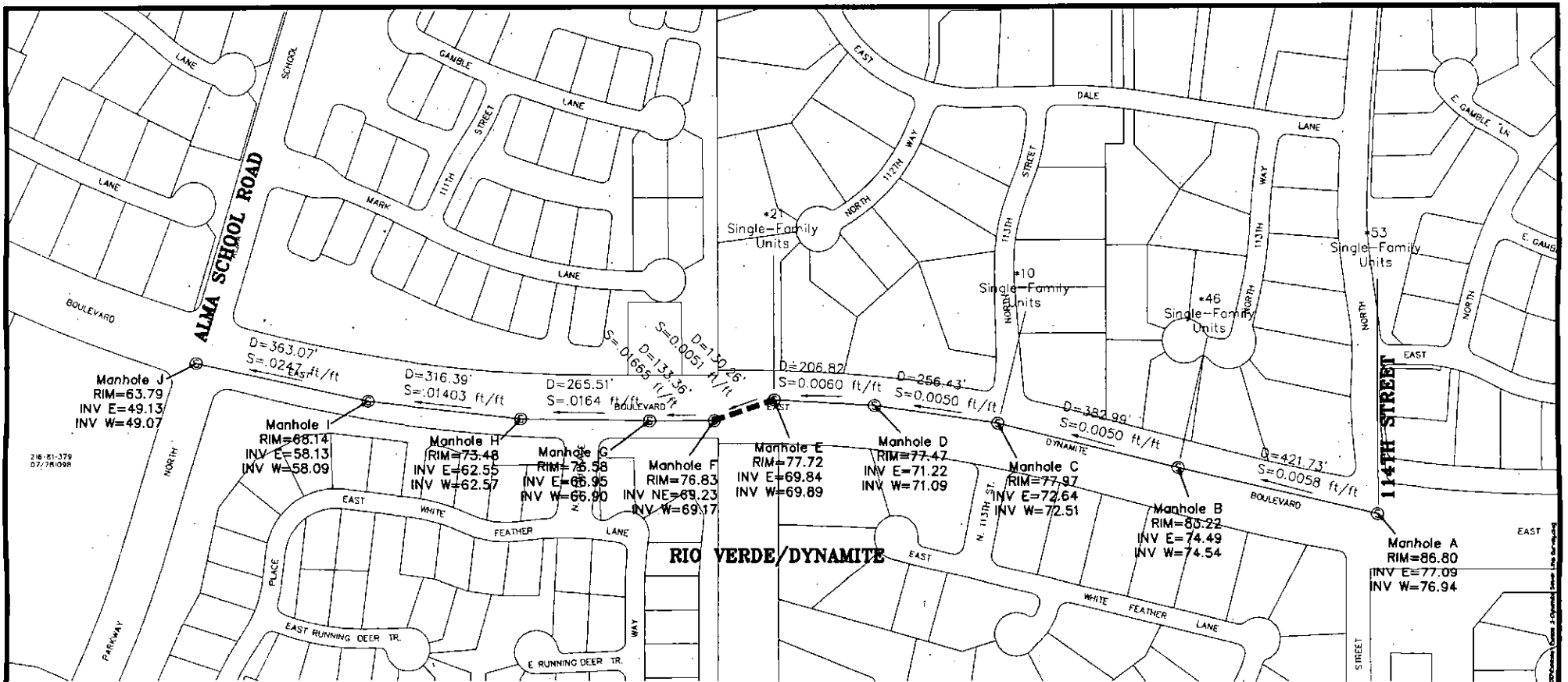
SCOTTSDALE NATIONAL GOLF CLUB

FIGURE 1
VICINITY MAP

WOOD/PATEL
2051 W. Northern Ave.
Phoenix, AZ 85021
(602) 335-8500
www.woodpatel.com
JOB NO. 144147

FIGURE 2

Existing Dynamite Gravity Sewer Line Survey

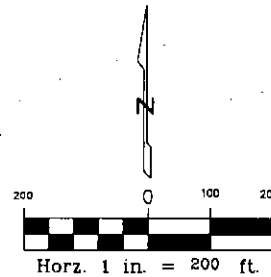


LEGEND

D=DISTANCE
S=SLOPE
ft=FEET
INV=INVERT
⊙=SEWER MANHOLE
--- CRITICAL SEGMENT
OF SEWER LINE

PRELIMINARY
NOT
FOR
CONSTRUCTION
OR RECORDING

* Unit counts taken
from City of
Scottsdale Quarter
Section Maps 51-54,
51-55, and 52-55



NOT FOR
CONSTRUCTION

Scottsdale National Golf Club

Figure 2
**DYNAMITE SEWER
LINE SURVEY**

WOOD/PATEL
2001 W. Mountain Ave.
Phoenix, AZ 85021
(602) 955-0000
www.woodpatel.com
office: 602-955-0000
JOB NO. 113787

FIGURE 3

SNGC Sewage Lift Station #47 Wastewater System

N:\2014\144147\Project Support\Reports\Sewer BOD\Exhibits\144147-Plate 2-Onsite Sewer Exhibit.dwg

LEGEND

- FORCE MAIN
- 8" EXISTING SEWER
- 8" PLANNED SEWER
- PRIVATE FORCE MAIN OPTION



WOOD/PATEL
MISSION: CLIENT SERVICE™
(602) 335-8500
WWW.WOODPATEL.COM
PHOENIX - MESA - TUCSON

NOT
FOR
CONSTRUCTION
OR RECORDING

SCOTTSDALE NATIONAL GOLF CLUB				
Figure 3 - WASTEWATER EXHIBIT FULL BUILDOUT				
DATE	SCALE		SHEET	
02-06-15	1" = 700'		1 OF 1	
JOB NO.	DESIGN	DWM	CHECK	DWM
144147	DRAWN	SCM		