SCS ENGINEERS







Operation, Maintenance, and Monitoring Plan

Newberry County Landfill

Soil Gas Extraction System

Presented to:

Newberry County

1309 College Street
Newberry, South Carolina 29108

Presented by:

SCS ENGINEERS
2520 Whitehall Park Drive, Suite 450
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(704) 504-3107

May 2015
File No. 02212302.02

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File No. 02221302.02
May 29, 2015
Revised: June 22, 2015

John Abernathy
South Carolina Department of Health and Environmental
Solid Waste Groundwater Section
Bureau of Land & Waste Management
2600 Bull Street
Columbia, SC 29201

Subject: Operation, Maintenance, and Monitoring Plan - Soil Gas Extraction System
Newberry County Class 3 Landfill
SW Permit #081001-1102
Newberry, South Carolina

Dear Mr. Abernathy:

On behalf of Newberry County, SCS Engineers submits the Operation, Maintenance, and Monitoring Plan (OM&M Plan) for the Soil Gas Extraction System for the Newberry County Class 3 Landfill (SW Permit DWP-117). The OM&M Plan includes the Record Drawings for the completed Soil Gas Extraction System as well as the general guidelines for the operation, maintenance and monitoring activities for the system. This OM&M Plan was prepared to address comment #3 in the Corrective Measures Study & Selected Remedy approval letter dated July 8, 2014.

CERTIFICATION

I, Steven C. Lamb, hereby certify the Soil Gas Extraction System for the Newberry County Landfill was construction in general accordance to the "Construction Drawings, Soil Gas Remedial Design" prepared by SCS Engineers dated November 11, 2014. Furthermore, I certify the system was designed in general accordance with the "Corrective Measures Study (CMS) & Selected Remedy" prepared by SCS Engineers dated June 17, 2014.

If you have any questions, please contact me at 704-504-3107.

Sincerely,

Steven C. Lamb, PE
Vice President
SCS ENGINEERS

SOUTH CAROLINA STEARNS CONRAD & SCHMIDT CONSULTING ENGINEERS No. CO2030 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 23437 STEVEN C. LAMB 6/22/15

cc: Mike Pisano, Newberry County, Public Works Director

Enclosure

M:\PROJECT FILES\02212302.02 - newberry soil gas design\OM&M Plan\dhec omm plan transmittal ltr_revised.docx

Operation, Maintenance, and Monitoring Plan
Soil Gas Extraction System
Closed Newberry County Landfill

Presented To:

Newberry County
1309 College Street
Newberry, South Carolina 29108

Presented From:

SCS ENGINEERS
2520 Whitehall Park Drive, Suite 450
Charlotte, NC 28273
(704) 504-3107

May 2015
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PREFACE

This Operation, Maintenance, and Monitoring (OM&M) Plan has been prepared for Newberry County specifically for the Soil Gas Extraction System at the closed Newberry County Class 3 Landfill in Newberry, South Carolina. The OM&M plan provides a description of the system facilities, procedures for operating and monitoring the system, troubleshooting procedures, and maintenance requirements.

Record Drawings, operating instructions and manufacturer's information for the primary equipment are contained in the Appendices of the Plan.

This OM&M Plan has been written as a technical guide for Newberry County and the system operator, who should become familiar with and follow the information contained in the Plan, including the monitoring procedures, equipment maintenance procedures, and instructions for how and when to make operational adjustments. Additionally, Newberry County and the system operator should remain alert to activities and changing conditions at the landfill that could decrease the effectiveness of the soil gas extraction system.

1.0 INTRODUCTION

This Operation, Maintenance & Monitoring Plan (OM&M Plan) was prepared on the behalf of Newberry County for the Newberry County Class 3 Landfill (Solid Waste Permit DWP-117). This OM&M Plan was prepared to address the operation, maintenance, and monitoring requirements for the Soil Gas Extraction System located at the closed Landfill. The Landfill is located at 423 Cockrell Road in Newberry, South Carolina approximately 2 miles east of the City of Newberry (See **Figure 1**).

Due to groundwater contamination (select volatile organic compounds [VOCs] in select wells at concentrations above groundwater protection standards) and methane gas contractions exceeding the regulatory limit in perimeter monitoring probes, a Corrective Measures Study was prepared and submitted to SCDHEC in June 2014 pursuant to 61-107.19, Part V, Subpart E 258.56. In addition, the Corrective Measures Study included the selected remedy pursuant to 61-107.19, Part V, Subpart E 258.57. SCDHEC approved the Corrective Measures Study and Selected Remedy - a Soil Gas Extraction System.

1.1 BACKGROUND

The Newberry County Landfill is an unlined landfill that accepted MSW from about 1972 until December 1993. The 56.7-acre site includes two disposal areas – Phase I, which is approximately 27.2 acres, is located in the northern portion of the site, while Phase II, about 29.5 acres, is located in the southern portion of the site. As is typical of landfills that operated at that time, both disposal areas are unlined. According to historical documents, both phases were constructed and operated as "trench-style" landfills. The design, construction, and operation of the landfill pre-dated EPA's Subtitle D regulations for MSW landfills, which became effective October 9, 1993.

The Phase II disposal area was closed with a two-foot engineered soil cap in November 1994. In accordance with South Carolina solid waste regulations and the Landfill's Closure and Post Closure Plan, the Landfill has perimeter gas monitoring probes and a network of groundwater monitoring wells. Details concerning closure of the Phase I disposal area are not available. However, Phase I is currently area heavily vegetated and no known visible waste is present indicating an adequate soil cover.

Post-closure care, including subsurface methane gas monitoring at the property boundary and groundwater monitoring and reporting, is being performed in accordance with the South Carolina Class 3 solid waste regulations, and has been ongoing since the mid-1990s. As a result of intermittent elevated methane concentrations in several gas monitoring probes, the County initiated a phased corrective measures approach starting in 2006. An initial corrective measure included the installation of a passive vent trench in the eastern portion of the site, between the waste boundary and the property boundary. While the passive corrective measures have undoubtedly aided the venting of landfill gas (LFG) to the atmosphere, methane concentrations in several gas monitoring probes around Phase II remained above the compliance limit. Thus, the existing passive measures were not sufficient, and a more aggressive approach to LFG

migration control was required to achieve compliance – i.e, to reduce methane concentrations to below the compliance limit (the lower explosive limit or LEL) at the compliance probes.

The next logical step in the phased corrective action program was the installation of an active (as opposed to passive) subsurface soil gas collection system in areas where methane concentrations remain above acceptable limits.

The current monitoring network at the Landfill consists of six (6) gas monitoring probes (GMPs), GMP-1 and GMP-3 through GMP-7, as shown on **Figure 2**. These compliance probes are located to monitor subsurface gas concentrations at the property boundary. These probes are monitored on a semi-annual basis for the presence of methane gas.

1.2 PURPOSE

The purpose of the soil gas extraction system is to extract subsurface gas, including methane and trace VOCs, from the subsurface so that the methane gas monitoring probes stay in compliance (i.e., below 5 percent methane, which equates to 100 percent of the lower explosion limit (LEL)). In addition, the extraction of subsurface gas will reduce the potential for VOCs to migrate to groundwater.

The purpose of this OM&M Plan is to provide Newberry County and its consultants with a comprehensive document that contains the maintenance requirements and the monitoring requirements for the soil gas extraction system. In addition, the purpose of this OM&M Plan is to provide operating guidelines for the system to optimize its effectiveness.

1.3 SOIL GAS EXTRACTION SYSTEM OVERVIEW

The soil gas extraction system includes twenty four (24) extraction wells, spaced about 125 to 150 feet, installed between the limits of waste and the property boundary. A vacuum is applied to the wells via a 10-Hp blower and an underground piping network. The applied vacuum withdrawals soil vapor from the subsurface. There are three zones (Zone A, B, and C) each with its dedicated header pipe and a condensate sump, as follows:

- Zone A: Extraction wells EW-1 through EW-8
- Zone B: EW-9 to EW-14, EW-16 and EW-17
- Zone C: ES-18 to EW-25

Passive wells EW-26 and EW-27 were installed to the north of Zone C, and are not connected to the active extraction piping system.

The Treatment Compound includes the blower enclosure, a vapor-phase activated carbon canister, an air compressor, an aboveground storage tank for condensate, a piping control panel with three actuated valves, and an electrical panel. An electronic control system allows automated operation of the three zones, and can be adjusted to control the timing for each zone.

A condensate sump is located at a low point within the header pipe to collect condensate in the gas. Condensate is generated when the extracted gas cools down within the header pipe. A pneumatic pump located in each sump pumps the condensate back to the storage tank located at the Treatment Compound.

A summary of the primary equipment and features of the soil gas extraction system are summarized in **Table 1**. The Record Drawings for the soil gas extraction system are provided in **Appendix A** and a Site Plan showing the extraction wells is shown in **Figure 3**. Soil gas extraction well completion logs and photographs of the construction are provided in **Appendix B**.

1.4 GENERAL SAFETY PRECAUTIONS

LFG migration and accumulation can create a hazard, since the methane present in LFG is combustible. Methane is a colorless, odorless gas that is explosive at concentrations between 5 and 15 percent by volume in air and when in the presence of oxygen and a source of ignition.

Since methane in LFG is combustible, the guiding criteria when working in areas where the presence of LFG is suspected are to exercise caution, use methane detection instrumentation, and avoid producing a spark in these areas. Smoking should not be permitted while working on or within 25 feet of the LFG collection system. Personnel should use intrinsically safe flashlights or mirrors, never matches or lighters, to assist in visual inspection.

When conducting repairs, the operator should isolate the repair area from LFG by closing appropriate valves, plugging the pipes, and/or shutting down portions of the system. Workers also should remain alert to other nearby maintenance or construction activities that could damage the control system or cause personal injury.

LFG can collect in valve boxes, manholes, electric panel boxes, the condensate collection system, and any above- or below-grade enclosures on or near the landfill. The LFG collection system piping probably will be filled with LFG, whether or not the blowers are operating.

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PROJECT NO.	DRAWN BY
02212302.01	DMC
CAD FILE	SCALE
REMEDIATION FIGUES 1-5	AS SHOWN

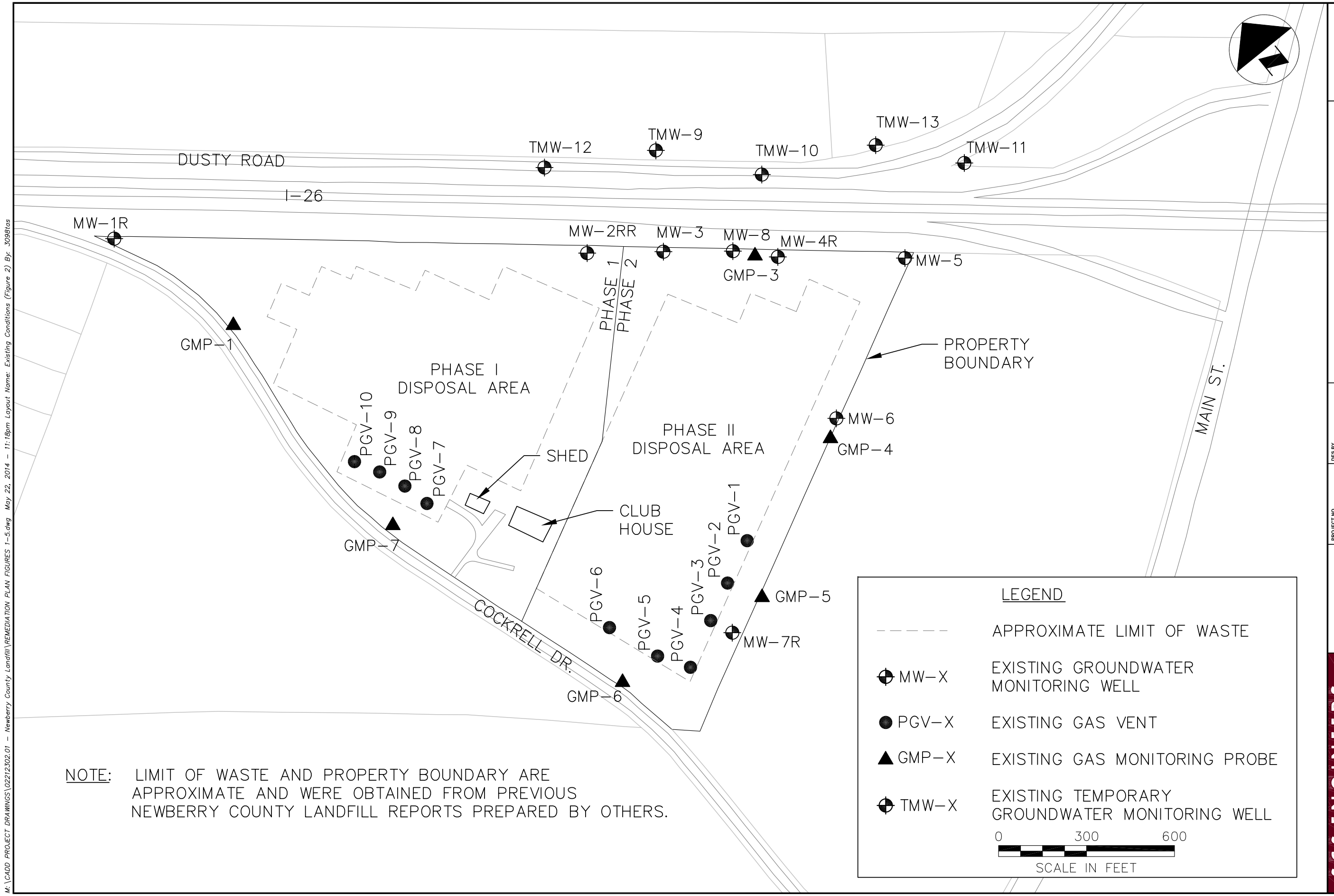
SITE VICINITY PLAN

FORMER NEWBERRY COUNTY MSW LANDFILL

NEWBERRY COUNTY

DATE
05/23/14

FIGURE
FIGURE 1



NOTE: LIMIT OF WASTE AND PROPERTY BOUNDARY ARE APPROXIMATE AND WERE OBTAINED FROM PREVIOUS NEWBERRY COUNTY LANDFILL REPORTS PREPARED BY OTHERS.

LEGEND

- APPROXIMATE LIMIT OF WASTE
- MW-X — EXISTING GROUNDWATER MONITORING WELL
- PGV-X — EXISTING GAS VENT
- GMP-X — EXISTING GAS MONITORING PROBE
- TMW-X — EXISTING TEMPORARY GROUNDWATER MONITORING WELL

0 300 600

SCALE IN FEET

SITE PLAN
FORMER NEWBERRY CO. MSW LANDFILL
NEWBERRY, SC

DATE 04/18/14
FIGURE FIGURE 2

PROJECT NO.	02212302.01
SCALE	AS SHOWN
CAD FILE	EX. COND.
DES BY	TAS
CHK BY	DMC
APP BY	SCL

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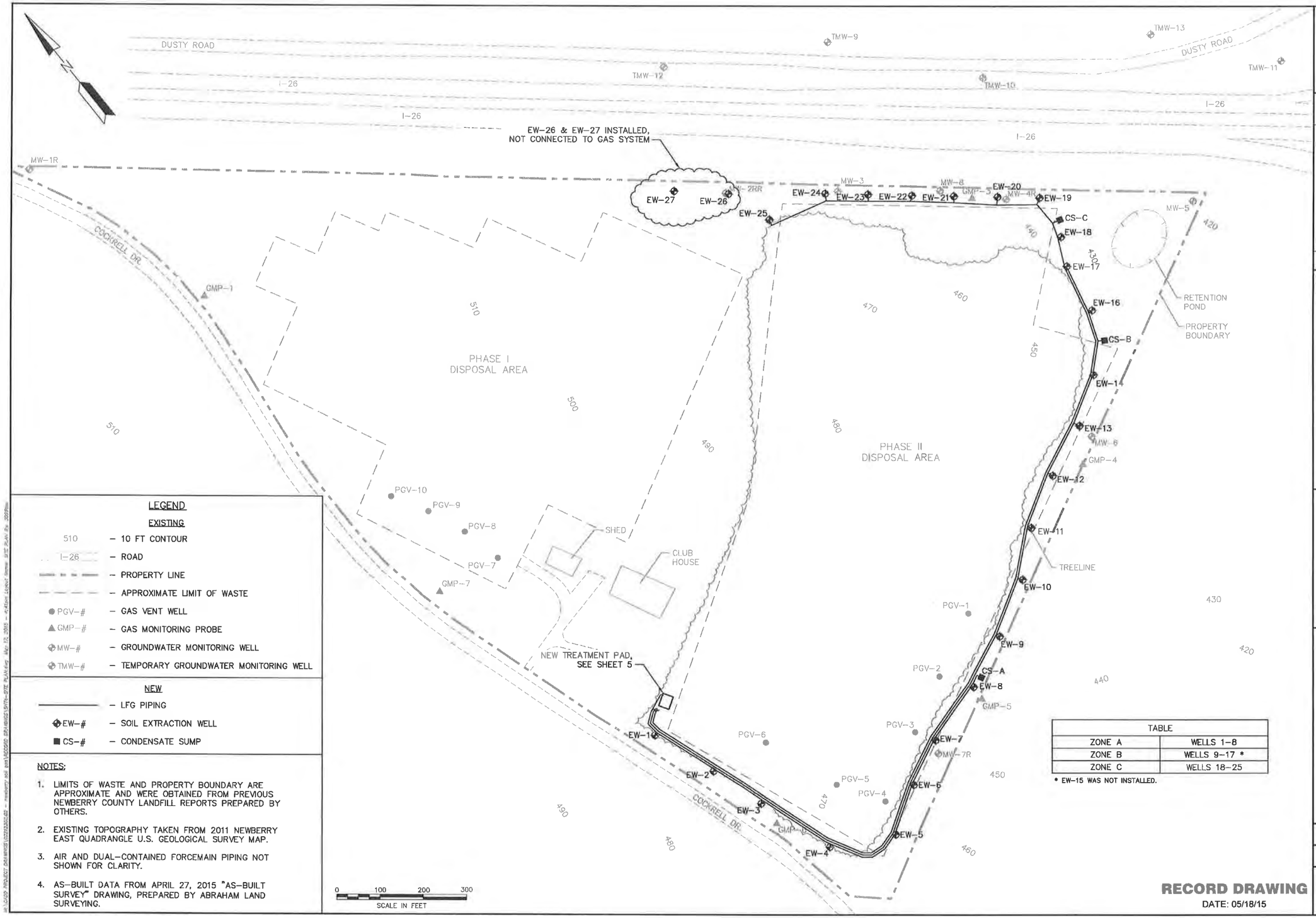
M:\CADD PROJECT DRAWINGS\02212302.01 - Newberry County Landfill\REMEDIATION PLAN FIGURES 1-5.dwg May 22, 2014 - 11:18pm Layout Name: Existing Conditions (Figure 2) By: 3098tos

Table 1. Summary of Equipment

Common Name	Detailed Name	Manufacturer	Description
Soil Extraction Well	Soil Gas Extraction Wells EW-1 through EW-27	NA	4-inch diameter slotted PVC pipe within a 10" diameter borehole.
Blower Enclosure			
Blower	10-HP Regenerative Blower	Ametek Rotron Model# EN858BD72WL	Skid mounted, aluminum fan blower, 10 HP, 230 VAC, 3PH, XP with thermal overload
Knock Out Pot (KOP)	Moisture Separator	Geotech	37-gallon steel canister with enamel finish. Protects the motor from excess moisture.
Transfer Pump	Effluent Transfer Pump	Goulds Model #10141	½ HP effluent transfer pump, 230 VAC, 3PH. Pumps liquids from the KOP to Storage Tank.
Autodialer	Autodialer	Sensaphone Model 400 Autodailer	Autodialer that calls out when alarms are encountered.
Control Panel	Geotech Environmental Control Module (GECM)	Geotech	NEMA 4X enclosure mounted to blower enclosure. Contains LCD display, on/off/auto switch controls, three valve timers, autodialer.
Other Components			
Carbon Vessel	Vapor Phase Granular Activated Carbon Vessel GAC V-1000	Tetrasolv, Inc. VF-1000	1,000 pounds GAC vessel.
Air Compressor	5-Hp Reciprocating Air Compressor	Ingersoll Rand, Model 2475N5	Air compressor with an 80-gallon tank.
Storage Tank	1,000 gallon Effluent Storage Tank	Poly Processing	Aboveground storage tank for condensate generated in the extracted gas.
Condensate Sump Pump	Condensate Sump Pump	Pump One XP-4-BL	Pneumatic submersible pump
Well Head	Orifice Plate Well Head	QED, Model ORP-115	Wellhead on well casing. Includes sample ports and control valve.



LEGEND

EXISTING

- 510 – 10 FT CONTOUR
- I-26 – ROAD
- – PROPERTY LINE
- – APPROXIMATE LIMIT OF WASTE
- PGV-# – GAS VENT WELL
- GMP-# – GAS MONITORING PROBE
- MW-# – GROUNDWATER MONITORING WELL
- TMW-# – TEMPORARY GROUNDWATER MONITORING WELL

NEW

- – LFG PIPING
- EW-# – SOIL EXTRACTION WELL
- CS-# – CONDENSATE SUMP

NOTES:

1. LIMITS OF WASTE AND PROPERTY BOUNDARY ARE APPROXIMATE AND WERE OBTAINED FROM PREVIOUS NEWBERRY COUNTY LANDFILL REPORTS PREPARED BY OTHERS.
2. EXISTING TOPOGRAPHY TAKEN FROM 2011 NEWBERRY EAST QUADRANGLE U.S. GEOLOGICAL SURVEY MAP.
3. AIR AND DUAL-CONTAINED FORCEMAIN PIPING NOT SHOWN FOR CLARITY.
4. AS-BUILT DATA FROM APRIL 27, 2015 "AS-BUILT SURVEY" DRAWING, PREPARED BY ABRAHAM LAND SURVEYING.

0 100 200 300
SCALE IN FEET

TABLE	
ZONE A	WELLS 1-8
ZONE B	WELLS 9-17 *
ZONE C	WELLS 18-25

* EW-15 WAS NOT INSTALLED.

RECORD DRAWING
DATE: 05/18/15

NO.	REVISION	DATE

SHEET TITLE: **REMEDIATION SITE PLAN**

PROJECT TITLE: **SOIL GAS REMEDIAL DESIGN NEWBERRY COUNTY LANDFILL**

CLIENT: **NEWBERRY COUNTY**
PO BOX 156
NEWBERRY, SC 29108

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PROJ. NO. 02271302.02
DSN. BY: SCL
DWN. BY: TAS
CHK. BY: ADG
QA REVIEW BY: MM
APPROVED BY: SCL

DATE: MAY 2015
SCALE: AS SHOWN
DRAWING NO. 4 of 12

2.0 MAINTENANCE REQUIREMENTS

This section summarizes the maintenance requirements for the primary equipment. A maintenance checklist form in provided as **Exhibit 1**.

2.1 BLOWER ENCLOSURE

The Blower Enclosure is manufactured by Geotech. The enclosure includes the following:

- 10-Hp Blower
- 37-gallon Knockout Pot (KOP)
- ½-Hp effluent transfer pump at KOP
- Vacuum gauges
- Flowmeter

The maintenance requirements are provided in Section 4 of the manufacturer's operations manual, which is provided in **Appendix C.**

2.2 ELECTRICAL INFORMATION

The electrical service along Cockrell Road and at the site is 230V, 1-phase. Since the blower is a 3-phase blower, a static phase converter is included on the electrical panel.

Electrical information on the phase converter and other electrical components is provided in **Appendix D.**

2.3 AIR COMPRESSOR

An air compressor is located in the treatment compound. The air compressor is used to supply compressed air to the pneumatic pumps located in the three condensate sumps. The air compressor is manufactured by Ingersoll Rand. The compressor is 5-HP reciprocating compressor with an 80-gallon received tank. According to the compressor literature, supplied by Ingersoll Rand and provided in **Appendix E**, the following pre-operational checks should be performed:

- Drain condensate from air tank
- Check oil level
- Clean air filter

Refer to **Appendix E** for more information.

2.4 VAPOR PHASE CARBON CANISTER

Although not required by regulation or permits, the system is equipped with a vapor phase granular activated carbon (GAC) vessel. The GAC vessel is manufactured by Tetrasolv. The

primary purpose of the GAC vessel is odor control – i.e., to remove (by adsorption) trace concentrations of odiferous organic and sulfur-based compounds. It should be noted that the GAC vessel does not treat/capture methane gas. The methane gas fraction in the extracted soil vapor will not be adsorbed in the GAC vessel; therefore, smoking is prohibited within the treatment compound.

No routine maintenance or testing of the vapor phase activated carbon vessel is required. During any monitoring event or site visit, the vessel should be visually inspected for normal wear and tear, and odor levels, if any, should be documented. If/when odors become significant, the carbon should be replaced.

Information on the GAC vessel is provided in **Appendix F.**

2.5 PNEUMATIC PUMP AND STORAGE TANK

Three condensate sumps, designated CS-A, CS-B, and CS-C, are located at the low points within each header system zone. The sumps are designed to collect condensate from the extracted soil gas. Each sump is equipped with a pneumatic pump. A 2-inch diameter pipe supplies compressed air to operate the pump. A dual contained force main (2"/4") is used to convey the condensate back to the treatment compound and in a 1,000-gallon dual-walled above ground poly storage tank.

Pneumatic pump inspection and cleaning intervals depend upon condensate quality, which varies from site to site. Initially, the pneumatic pumps should be pulled, inspected, and cleaned about every 6 months. This interval can be adjusted based on experience. Procedures for removing the pump and re-installing the pump are provided in the literature (**Appendix G)** provided by the pump supplier, PumpOne Environmental, LLC.

Information on the storage tank is provided in **Appendix I**.

Liquids in the storage tank shall be disposed of by the County. Prior to disposal, the County should contact the local POTW and determine the wastewater profiling or analytical testing requirements, if any.

Monitoring Form

Newberry County Landfill
Soil Gas Extraction System

Date		**Weather**	
Technician			

Equipment	**Comments/Condition**		
Blower Enclosure			
Blower			
KOP	Liquid Level		
Transfer Pump			
Gages			
Inlet vacuum			
Outlet vaccum			
Carbon Vessel			
Storage Tank	Liquid Level		
Air compressor			
Air Compressor Shed			
Process Control Panel			
Actuated valves			
Process Control Panel			

Process Control Panel Gauges	**Vacuum**	**Methane**	**Temp.**
Zone A			
Zone B			
Zone C			
Blower Inlet			

Inlet Gage at KOP (in. WC)	
Outlet Gage at KOP (in. WC)	
Differential Pressure (in. WC)	
Flow rate (SCFM)	

3.0 MONITORING REQUIREMENTS

This section describes the routine monitoring for the soil gas extraction system.

3.1 SYSTEM START UP MONITORING

For the first three months, the system was monitored twice a month. The system was substantially completed on May 8, 2015. On May 12, 2015, the first monitoring round was conducted by SCS. Data from the initial rounds of monitoring are contained in **Appendix J**.

The objective of the initial three months of monitoring is to balance the well field and gain a better understanding of how the extraction wells and overall system performs.

3.2 REGULAR SYSTEM MONITORING

The soil gas extraction system should be monitored at least on a monthly basis. The following monitoring should be performed on the system on the monthly basis:

1. Measure and record the system vacuum, methane content and oxygen content at the sample ports located on the Header A pipe, Header B pipe, Header C pipe, and the blower inlet. These ports are located in the Treatment Compound. Perform this prior to and after monitoring the well field.

2. Record the system flow rate from the flow meter located inside the Blower Enclosure.

3. Record the vacuum gauge readings on the inlet and outlet pipe at the knock out pot located in the Blower Enclosure.

4. Measure and record the system vacuum, wellhead vacuum, methane content, and oxygen content at each soil extraction well wellhead using a LandGEM gas analyzer, or equivalent. Information on the well head is located in **Appendix I**.

5. Measure and record the differential pressure across the orifice plate located on the wellhead. The LandGEM gas analyzer should convert this reading to a flow rate in standard cubic feet per minute (scfm).

6. Record the liquid level in the knock out pot, if any.

7. Record the liquid level in the storage tank, if any.

8. Record the pressure gauge reading on the air compressor.

9. Record the stroke counters on the three condensate sumps (CS-A, CS-B, and CS-C).

Monitoring forms are provided in **Exhibit 2** that could be used to document the monitoring activities.

3.3 PERIMETER PROBES

As stated previously, there are six (6) permanent perimeter monitoring probes around the Landfill. These probes are designated: GMP-1, GMP-3, GPM-4, GMP-5, GMP-6, and GMP-7. These probes are monitored twice a year by the County and their results are included in the Semi-Annual Groundwater Report, which is submitted to SCDHEC. The most recent probe monitoring was performed by Rogers & Callcott on February 4, 2015.

It is recommended to monitor and record the methane gas concentrations and the static pressure on a monthly basis at the four perimeter probes that are adjacent to the soil gas extraction wells: GMP-3, GMP-4, GMP-5 and GMP-6.

Monitoring Form

Newberry County Landfill
Soil Gas Extraction System

Date		**Weather**	
Technician			

Equipment	**Comments/Condition**		
Blower Enclosure			
Blower			
KOP	Liquid Level		
Transfer Pump			
Gages			
Inlet vacuum			
Outlet vaccum			
Carbon Vessel			
Storage Tank	Liquid Level		
Air compressor			
Air Compressor Shed			
Process Control Panel			
Actuated valves			
Process Control Panel			

Process Control Panel Gauges	**Vacuum**	**Methane**	**Temp.**
Zone A			
Zone B			
Zone C			
Blower Inlet			

Inlet Gage at KOP (in. WC)	
Outlet Gage at KOP (in. WC)	
Differential Pressure (in. WC)	
Flow rate (SCFM)	

Monitoring Form

Newberry County Landfill
Soil Gas Extraction System

Date		**Weather**	
Technician			

Equipment	**Comments/Condition**		
Blower Enclosure			
Blower			
KOP	Liquid Level		
Transfer Pump			
Gages			
Inlet vacuum			
Outlet vaccum			
Carbon Vessel			
Storage Tank	Liquid Level		
Air compressor			
Air Compressor Shed			
Process Control Panel			
Actuated valves			
Process Control Panel			

Process Control Panel Gauges	**Vacuum**	**Methane**	**Temp.**
Zone A			
Zone B			
Zone C			
Blower Inlet			

Inlet Gage at KOP (in. WC)	
Outlet Gage at KOP (in. WC)	
Differential Pressure (in. WC)	
Flow rate (SCFM)	

4.0 SYSTEM OPERATIONS

As previously stated the primary objectives of the Soil Gas Extraction System are to:

- Extract methane gas from the subsurface so that the methane gas perimeter monitoring probes stay in compliance (i.e., below 5 percent methane, which equates to 100 percent of the lower explosion limit (LEL)).
- Capture traces of VOCs in the subsurface gas, thereby reducing the possibility of migration to groundwater.

To meet these objectives, the vacuum applied to the soil gas extraction wells should be such that it captures subsurface gas before it reaches the property boundary. However, the vacuum applied should be minimal so that excess methane gas is not also drawn out the waste mass.

4.1 NORMAL OPERATIONS AND SYSTEM BALANACING

Normal operations should be as follows:

- All three zones are open (valve A, B, and C are open).
- In general the applied vacuum at each well should be initially set between -1 inches of water column (in. WC) and -10 in. WC. Alternatively the well could be balanced based on an average flow in the 10 scfm range.

Based on the initial rounds of monitoring, this results in approximately 200 to 250 scfm of soil gas being extracted from the 24 wells, or about 10 scfm per well.

It is recommended to operate the system in this range for at least 6 months, possibly longer.

4.2 SYSTEM ADJUSTMENTS GUIDELINES

After six months of system operation under these normal conditions, it may be beneficial to re-balance the system based on the perimeter probe readings, the individual wellhead readings, or the methane content within each of the three zones. For example, it the methane content from a particular well, say EW-5, is less than 2 percent, EW-5 could be turned off or its applied vacuum reduced to less than 1 in. WC.

The methane content for each zone should also be examined. If the entire zone has methane content in the 2 percent range, the entire zone could be operated less than 24 hours/day. Each zone is equipped with an electric actuated valve which operates on a timer. The timer could be set to allow the zone to operate only a few hours a day instead of 24 hours a day.

The goal of these two system adjustments is to allocate more blower capacity to areas of the system where methane gas concentrations remain high, or where the perimeter probes are not in compliance.

After any adjustment, the effects of the adjustments should be examined. This would typically involve comparing the methane gas concentration at the six perimeter probes.

5.0 REPORTING AND SYSTEM CLOSE OUT

5.1 REPORTING REQUIREMENTS

Quarterly reports should be prepared and submitted to SCDHEC. The quarterly reports shall include the following:

- A general description of the system.
- Summary of the flow and methane content at the blower inlet.
- Perimeter probe monitoring results.
- Summary of well head data (methane, oxygen).

In addition, the system data should be provided in the Semi-Annual Groundwater and Methane Monitoring Report, and an Annual Groundwater and Methane Monitoring Report for the Landfill to SCDHEC.

5.2 SYSTEM CLOSE OUT PROCEDURES

Pursuant to 61-107.19, Part V, Subpart E 258.58 (e):

e. Remedies selected pursuant to Section 258.57 shall be considered complete when:

(1) The permittee complies with the groundwater protection standards established in Section 258.55.j or k at all points within the plume of contamination that lie beyond the groundwater monitoring well system, established in Section 258.51.a.

(2) Compliance with the groundwater protection standards established in Section 258.j or k has been achieved by demonstrating that concentrations of Appendix V constituents have not exceeded the groundwater protection standard(s) for a period of three consectivtive years using statistical procedures and performance standards in Section 258.g and h. the Depatment may specify an alternative length of time during which the permittee shall demonstrate the concentrations of Appendix v constituents have note exceeded the groundwater protection standard(s) taking into consideration:

(a) Extent and concentration of the release(s)

(b) Behavior characteristics of the hazardous constituents in the groundwater.

(c) Accuracy of monitoring or modeling techniques, including any seasonal, meteorological, or other environmental variabilities that may affect the accuracy; and,

(d) Characteristics of the groundwater.

APPENDICES

APPENDIX A

RECORD DRAWINGS

SOIL GAS REMEDIAL DESIGN
NEWBERRY COUNTY LANDFILL

OWNER

NEWBERRY COUNTY
NEWBERRY COUNTY
PO BOX 156
NEWBERRY, SOUTH CAROLINA 29108
CONTACT: MIKE PISANO
PHONE: (803) 321-2180

SITE LOCATION

NEWBERRY COUNTY LANDFILL
432 COCKRELL ROAD
NEWBERRY, SOUTH CAROLINA 29108

ENGINEER

SCS ENGINEERS
2520 WHITEHALL PARK DRIVE, SUITE 450
CHARLOTTE, NORTH CAROLINA 28273
DESIGN ENGINEER: STEVE LAMB, PE
PHONE: (704) 504-3107

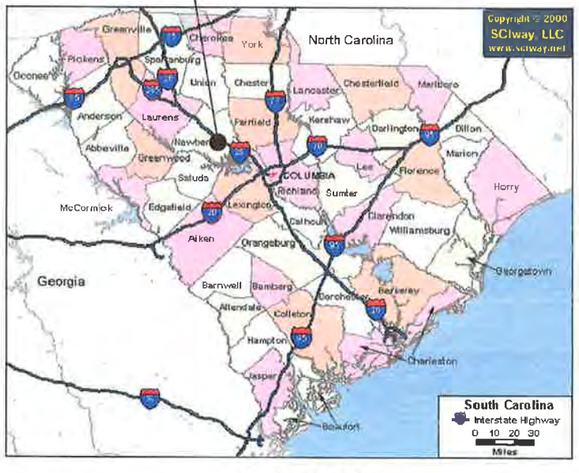
ELECTRICAL ENGINEER

BURDETTE ENGINEERING, INC.
102 PILGRIM ROAD
GREENVILLE, SOUTH CAROLINA 29607
CONTACT: BOBBY BAZEMORE
PHONE: (864) 297-8717

JOB NO. 02212302.02

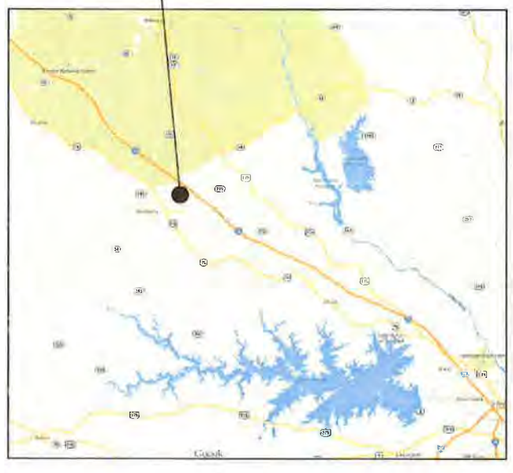
MAY 2015

SITE



AREA MAP
SCALE: AS SHOWN

SITE



LOCATION MAP
SCALE: AS SHOWN

INDEX OF SHEETS

SHEET NO.	DESCRIPTION
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3	EXISTING CONDITIONS PLAN
4	REMEDIATION SITE PLAN
5	TREATMENT COMPOUND PLAN
6	PROCESS FLOW DIAGRAM AND P&ID
7	EXTRACTION WELL DETAILS
8	PIPING DETAILS
9	STRUCTURAL DETAILS
10	FENCE DETAILS
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E2	ELECTRICAL POWER PLAN

RECORD DRAWING
DATE: 05/18/15

NO. | REVISION | DATE
1 | Record Drawing | 5/19/15

SHEET TITLE: TITLE SHEET
PROJECT TITLE: SOIL GAS REMEDIAL DESIGN
NEWBERRY COUNTY LANDFILL

CLIENT: NEWBERRY COUNTY
PO BOX 156
NEWBERRY, SC 29108

SCS ENGINEERS
2520 WHITEHALL PARK DRIVE, SUITE 450
CHARLOTTE, NORTH CAROLINA 28273
PHONE: (704) 504-3107 FAX: (704) 504-3174

PROJ. NO: 02212302.02
DSN. BY: SCL
DWN. BY: NPF/TAS
CHK. BY: ADG
QA/QC BY: JLM
APP. BY: SCL

DATE: MAY 2015
SCALE: AS SHOWN
DRAWING NO. 1 of 12

SUMMARY OF WORK

PART 1 - GENERAL

1.1 PROJECT DESCRIPTION

A. THE WORK CONSISTS OF THE CONSTRUCTION OF SOIL GAS EXTRACTION SYSTEM AND RELATED WORK AS SUMMARIZED BELOW AND SHOWN ON THE CONSTRUCTION DRAWINGS AND DESCRIBED IN THE SPECIFICATIONS.

B. WORK TASKS INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

1. BID ITEM 2 - MOBILIZE AND DEMOBILIZE.
2. BID ITEM 3 - SITE PREPARATION INCLUDING CONSTRUCTION OF TEMPORARY CONSTRUCTION ROADS, MOWING, CLEARING, PREPARING MATERIAL LAYDOWN AREAS, AND CONSTRUCTION SURVEYING AND STAKING.
3. BID ITEM 4 - RE-VEGETATE AREAS DISTURBED BY CONTRACTOR.
4. BID ITEM 5 – TRENCHING, PIPE INSTALLATION, BACKFILL, AND COMPACTION.
5. BID ITEM 6 – DRILLING AND WELL INSTALLATION.
6. BID ITEM 7 – FURNISH AND INSTALL WELLHEAD ASSEMBLY. THIS ITEM INCLUDES ALL MATERIALS NEEDED TO CONNECT THE PROCESS PIPING TO THE WELLHEAD TO MAKE THE WELL FULLY FUNCTIONING.
7. BID ITEM 8 – CONSTRUCT EQUIPMENT COMPOUND. THIS ITEM INCLUDES ALL ABOVEGROUND PIPING, VALVES, FITTINGS, GRAVEL SURFACE, CONCRETE PADS, PROCESS PIPING CONTROL PANEL, AND ANCILLARY ITEMS WITHIN THE EQUIPMENT COMPOUND.
8. BID ITEM 9 – FURNISH AND INSTALL AIR COMPRESSOR TO MAKE COMPLETE AND OPERATIONAL. THIS ITEM INCLUDES AN ENCLOSURE FOR THE AIR COMPRESSOR.
9. BID ITEM 10 – FURNISH AND INSTALL ABOVEGROUND CONDENSATE STORAGE TANK SYSTEM, INCLUDING THE TRANSFER PUMP AND LEVEL FLOAT CONTROLS.
10. BID ITEM 11 – FURNISH AND INSTALL PRE-PACKAGED BLOWERSYSTEM.
11. BID ITEM 12 – FENCING AND GATES
12. BID ITEM 13 – INSTALL ALL ELECTRICAL WORK, COMPLETE. THIS BID ITEM INCLUDES INSTALLATION OF ALL WIRING AND CONDUIT, ELECTRICAL PANELS, SITE GROUNDING, PHASE CONVERTER, SITE LIGHTING, AND ALL RELATED INCIDENTALS.
13. BID ITEM 14 – PROJECT CLOSE-OUT DOCUMENTS. THIS INCLUDES FURNISHING FOUR (4) COPIES OF OPERATION AND MAINTENANCE MANUAL AND THE AS-BUILT DRAWINGS.
14. BID ITEM 15 – STARTUP, TEST, AND OPERATE SOIL GAS EXTRACTION SYSTEM IN ACCORDANCE WITH SECTION 01800.
15. ALTERNATIVE BID ITEM 1 – OPERATE AND MAINTAIN OPERATE SOIL GAS EXTRACTION SYSTEM FOR A PERIOD NOT LESS THAN THREE (3) MONTHS IN ACCORDANCE WITH SECTION 01820.
16. ALTERNATIVE BID ITEM 2 – PROVIDE AND PLACE GRAVEL SURFACE FOR PERIMETER CONSTRUCTION ROAD

C. MISCELLANEOUS SITE WORK, INCLUDING CLEANUP, RESTORATION, AND VEGETATION OF THE AREAS DISTURBED DURING CONSTRUCTION.

D. CONTRACTOR SHALL PROVIDE ALL LABOR, SERVICES, SURVEYING, TOOLS, MACHINERY, EQUIPMENT, AND MATERIALS NECESSARY TO COMPLETE THE PROJECT.

1.2 DRAWINGS AND SPECIFICATIONS FURNISHED TO CONTRACTOR

A. TWO (2) SETS OF FULL-SIZE DRAWINGS AND SPECIFICATIONS SHALL BE FURNISHED TO THE CONTRACTOR FOR CONSTRUCTION AT NO CHARGE.

1.3 START UP ACTIVITIES

A. AFTER THE CONTRACTOR'S RECEIPT OF A NOTICE-TO-PROCEED FROM THE OWNER, CONTRACTOR SHALL BE ON-SITE WITHIN TWENTY-ONE (21) CALENDAR DAYS, AND SHALL COORDINATE START-UP WITH THE OWNER AND ENGINEER.

B. CONTRACTOR IS RESPONSIBLE FOR ESTABLISHING A SCHEDULE TO BE APPROVED BY THE ENGINEER AND THE OWNER, AND FOR THE SEQUENCE AND PROGRESS OF THE WORK.

1.4 CONTRACTOR'S USE OF PREMISES

A. WORK HOURS: WORK HOURS SHALL BE 7:00 A.M. TO 7:00 P.M. MONDAY – SATURDAY.

B. CONTRACTOR'S USE OF THE PREMISES SHALL BE CONFINED TO THOSE AREAS APPROVED BY THE OWNER.

C. CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR PROTECTION AND SAFEKEEPING OF MATERIALS STORED ON OR OFF THE PREMISES.

D. DAMAGE TO AREAS OUTSIDE THOSE APPROVED BY THE OWNER SHALL BE REPAIRED AND/OR STABILIZED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE OWNER.

E. SMOKING IS PROHIBITED AT THE NEWBERRY COUNTY LANDFILL.

1.5 OWNER OCCUPANCY AND LANDFILL OPERATIONS

A. THE NEWBERRY COUNTY LANDFILL LEASES A PORTION OF THE SITE TO THE TRIANGLE GUN CLUB WHICH OPERATES A SHOOTING RANGE. CONTRACTOR SHALL COOPERATE WITH THE CLUB OPERATIONS DURING CONSTRUCTION TO MINIMIZE CONFLICTS.

1.6 GENERAL

A. HISTORICAL USE OF SITE: THE SITE IS A CLOSED MUNICIPAL SOLID WASTE LANDFILL THAT IS PRESENTLY NOT ACCEPTING WASTE.

B. EXISTING GRADES: THE EXISTING GRADES MAY VARY FROM THOSE INDICATED ON THE CONSTRUCTION DRAWINGS.

C. EXISTING FEATURES: CONTRACTOR IS REQUIRED TO FIELD VERIFY THE LOCATION OF EXISTING FEATURES. THE EXISTENCE AND LOCATION OF EXISTING FEATURES ARE NOT GUARANTEED. BEFORE BEGINNING SITE WORK AND CONSTRUCTION OF THE PROJECT, INVESTIGATE AND VERIFY THE EXISTENCE OF EXISTING FEATURES.

D. FIELD VERIFICATION: PRIOR TO CONSTRUCTION, VERIFY THE LOCATION OF EXISTING FEATURES AT POINTS OF CONNECTION OR TIE-IN TO THE EXISTING COMPONENTS.

E. FIELD CONDITIONS AND MEASUREMENTS: CONTRACTOR SHALL BASE ALL MEASUREMENTS, BOTH HORIZONTAL AND VERTICAL, FROM ESTABLISHED BENCHMARKS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFICATION OF ALL DIMENSIONS AND CONDITIONS AT THE LANDFILL.

F. HAZARDOUS MATERIAL: SHOULD CONTRACTOR ENCOUNTER ANY SUSPECTED HAZARDOUS OR REGULATED SUBSTANCE DURING CONSTRUCTION, HE SHALL NOTIFY THE ENGINEER AND THE OWNER. THE OWNER WILL BE RESPONSIBLE FOR THE TESTING, HANDLING, AND DISPOSAL OF ANY REGULATED SUBSTANCES.

G. DISCREPANCIES: SHOULD CONTRACTOR DISCOVER ANY DISCREPANCY BETWEEN ACTUAL CONDITIONS AND THOSE INDICATED WHICH PREVENT FOLLOWING GOOD PRACTICE OR THE INTENT OF THE DRAWINGS AND SPECIFICATIONS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER, REQUEST CLARIFICATION AND INSTRUCTIONS, AND SHALL NOT PROCEED WITH WORK UNTIL RECEIVING NOTIFICATION FROM THE ENGINEER.

H. EROSION AND SEDIMENT CONTROL: CONTRACTOR SHALL COMPLY WITH EROSION AND SEDIMENT CONTROL REQUIREMENTS BY THE OWNER AND THE STATE, AND OTHERS AS APPROPRIATE.

I. SANITARY FACILITIES: CONTRACTOR SHALL PROVIDE SANITARY FACILITIES DURING THE DURATION OF THE WORK FOR USE BY CONTRACTOR AND SUBCONTRACTOR PERSONNEL AS WELL AS ENGINEER AND OWNER PERSONNEL.

1.7 SUBMITTALS

A. SITE HEALTH AND SAFETY PLAN: THE WORK IS WITHIN A ZONE OF POTENTIAL HEALTH AND SAFETY ISSUES. CONTRACTOR IS RESPONSIBLE FOR SITE HEALTH AND SAFETY FOR HIS EMPLOYEES. CONTRACTOR SHALL PREPARE A SITE HEALTH AND SAFETY PLAN, AND PROVIDE A COPY OF THIS PLAN TO THE ENGINEER AND THE OWNER FOR INFORMATIONAL PURPOSES ONLY. THE SITE HEALTH AND SAFETY PLAN SHALL BE PREPARED IN ACCORDANCE WITH APPLICABLE PROVISIONS OF OSHA REGULATIONS 29 CFR 1910.120 AND 1926.

B. CONSTRUCTION SCHEDULE: CONTRACTOR SHALL PROVIDE A CONSTRUCTION SCHEDULE FOR THE SEQUENCE AND PROGRESS OF THE WORK. SUBMIT WITHIN FIFTEEN (15) DAYS AFTER THE NOTICE TO PROCEED AND RECEIVING ENGINEERS APPROVAL PRIOR TO COMMENCING THE WORK.

C. SUBMIT SHOP DRAWINGS, RECORD DRAWINGS, MANUFACTURER'S SPECIFICATIONS AND LITERATURE FOR VARIOUS PRODUCTS, AND OTHER INFORMATION AS DESCRIBED HEREIN.

D. OTHER SUBMITTALS AS SPECIFIED IN THE CONTRACT DOCUMENTS.

1.8 SUPERINTENDENT

A. PROVIDE A SINGLE QUALIFIED FULL TIME SUPERINTENDENT FOR THE DURATION OF THE PROJECT. CONTRACTOR SHALL NOT CHANGE SUPERINTENDENT WITHOUT OWNER'S WRITTEN PERMISSION. CONTRACTOR'S PROPOSAL TO CHANGE PERSONNEL MUST BE JUSTIFIABLE TO THE OWNER, AND MUST DEMONSTRATE THAT THE PROPOSED REPLACEMENT POSSESSES ADEQUATE QUALIFICATIONS.

SUBMITTALS

1.1 DESCRIPTION

A. CONTRACTOR SHALL DEVELOP AND DISTRIBUTE PROJECT SUBMITTALS IN ACCORDANCE WITH PROCEDURES SPECIFIED HEREIN. THE REQUIRED SUBMITTALS INCLUDE, BUT ARE NOT LIMITED TO THE FOLLOWING:

1. CONSTRUCTION PROGRESS SCHEDULES
2. PROPOSED PRODUCTS LIST
3. PRODUCT DATA
4. SHOP DRAWINGS
5. SAMPLES
6. CERTIFICATES
7. MANUFACTURER'S INSTRUCTIONS
8. HEALTH AND SAFETY PLAN
9. RECORD DRAWINGS
10. PROJECT PHOTOGRAPHS
11. SURVEY DATA

1.2 SUBMITTAL PROCEDURES

A. TRANSMIT EACH SUBMITTAL WITH ENGINEER ACCEPTED FORM. SEQUENTIALLY NUMBER THE TRANSMITTAL FORM. REVISE SUBMITTALS WITH ORIGINAL NUMBER AND A SEQUENTIAL ALPHABETIC SUFFIX.

B. IDENTIFY PROJECT, CONTRACTOR, SUBCONTRACTOR OR SUPPLIER; PERTINENT DRAWING AND DETAIL NUMBER, AND SPECIFICATION SECTION NUMBER, AS APPROPRIATE.

C. APPLY CONTRACTOR'S STAMP, SIGNED OR INITIALED CERTIFYING THAT REVIEW, APPROVAL, VERIFICATION OF PRODUCTS REQUIRED, FIELD DIMENSIONS, ADJACENT CONSTRUCTION WORK, AND COORDINATION OF INFORMATION IS IN ACCORDANCE WITH THE REQUIREMENTS OF THE WORK AND CONTRACT DOCUMENTS.

D. FOR EACH SUBMITTAL, ALLOW 7 DAYS FOR REVIEW EXCLUDING DELIVERY TIME TO AND FROM THE CONTRACTOR.

1.3 CONSTRUCTION PROGRESS SCHEDULES

A. SUBMIT FOUR (4) COPIES OF THE INITIAL CONSTRUCTION SCHEDULE WITHIN 15 DAYS AFTER NOTICE TO PROCEED TO ENGINEER.

B. REVISE AND RESUBMIT FOUR (4) COPIES OF THE CONSTRUCTION SCHEDULE EVERY TWO WEEKS DURING THE PROGRESS MEETING.

C. SHOW COMPLETE SEQUENCE OF CONSTRUCTION BY ACTIVITY, IDENTIFYING WORK OF SEPARATE STAGES AND OTHER LOGICALLY GROUPED ACTIVITIES.

D. INDICATE ESTIMATED PERCENTAGE OF COMPLETION FOR EACH ITEM OF WORK AT EACH SUBMISSION.

1.4 PROPOSED PRODUCTS LIST

A. WITHIN 15 DAYS AFTER NOTICE TO PROCEED, SUBMIT LIST OF MAJOR PRODUCTS PROPOSED FOR USE, WITH NAME OF MANUFACTURER, TRADE NAME, AND MODEL NUMBER OF EACH PRODUCT. BELOW IS A LIST OF PRODUCTS THAT REQUIRE A SUBMITTAL:

1. PNEUMATIC PUMP
2. AIR COMPRESSOR
3. WELLHEAD
4. HEADER, AIR, AND FORCEMAIN PIPE
5. PVC WELL CASING
6. PACKAGED BLOWER SYSTEM
7. FENCING
8. PHASE CONVERTER
9. ELECTRICAL ENCLOSURES
10. VAPOR PHASE ACTIVATED CARBON VESSEL

B. FOR PRODUCTS SPECIFIED ONLY BY REFERENCE STANDARDS, GIVE MANUFACTURER, TRADE NAME, MODEL OR CATALOG

1.5 SHOP DRAWINGS

A. PROVIDE SHOP DRAWINGS FOR THE FOLLOWING:

1. AIR COMPRESSOR ENCLOSURE
2. FENCE AND GATE LAYOUT
3. SUMP
4. STORAGE TANK
5. PACKAGED BLOWER SYSTEM

RECORD DRAWING
DATE: 05/18/15

NO.	REVISION	DATE
1		
2		
3		
4		
5		
6		

SHEET TITLE: GENERAL NOTES & SPECIFICATIONS

PROJECT TITLE: SOIL GAS REMEDIAL DESIGN NEWBERRY COUNTY LANDFILL

CLIENT: NEWBERRY COUNTY, PO BOX 156, NEWBERRY, SC 29108

SCS ENGINEERS
2520 WHITEHALL PARK DRIVE, SUITE 450
CHARLOTTE, NORTH CAROLINA 28273
PHONE: (704) 504-3107 FAX: (704) 504-3174

PROJ. NO. 02212302.02 | DWN. BY: NPT/TAS | Q/A RVW BY: JLM
DSN. BY: SCL | CHK. BY: ADG | APP. BY: SCL

DATE: MAY 2015

SCALE: AS SHOWN

DRAWING NO. 2 of 12

LEGEND

510	– 10 FT CONTOUR
I-26	– ROAD
	– PROPERTY LINE
	– APPROXIMATE LIMIT OF WASTE
● PGV-#	– GAS VENT WELL
▲ GMP-#	– GAS MONITORING PROBE
MW-#	– GROUNDWATER MONITORING WELL
TMW-#	– TEMPORARY GROUNDWATER MONITORING WELL

NOTES:

1. LIMITS OF WASTE AND PROPERTY BOUNDARY ARE APPROXIMATE AND WERE OBTAINED FROM PREVIOUS NEWBERRY COUNTY LANDFILL REPORTS PREPARED BY OTHERS.
2. EXISTING TOPOGRAPHY TAKEN FROM 2011 NEWBERRY EAST QUADRANGLE U.S. GEOLOGICAL SURVEY MAP.

RECORD DRAWING
DATE: 05/18/15

NO. | REVISION | DATE

SHEET TITLE: EXISTING CONDITIONS PLAN

PROJECT TITLE: SOIL GAS REMEDIAL DESIGN NEWBERRY COUNTY LANDFILL

CLIENT: NEWBERRY COUNTY
PO BOX 156
NEWBERRY, SC 29108

SCS ENGINEERS
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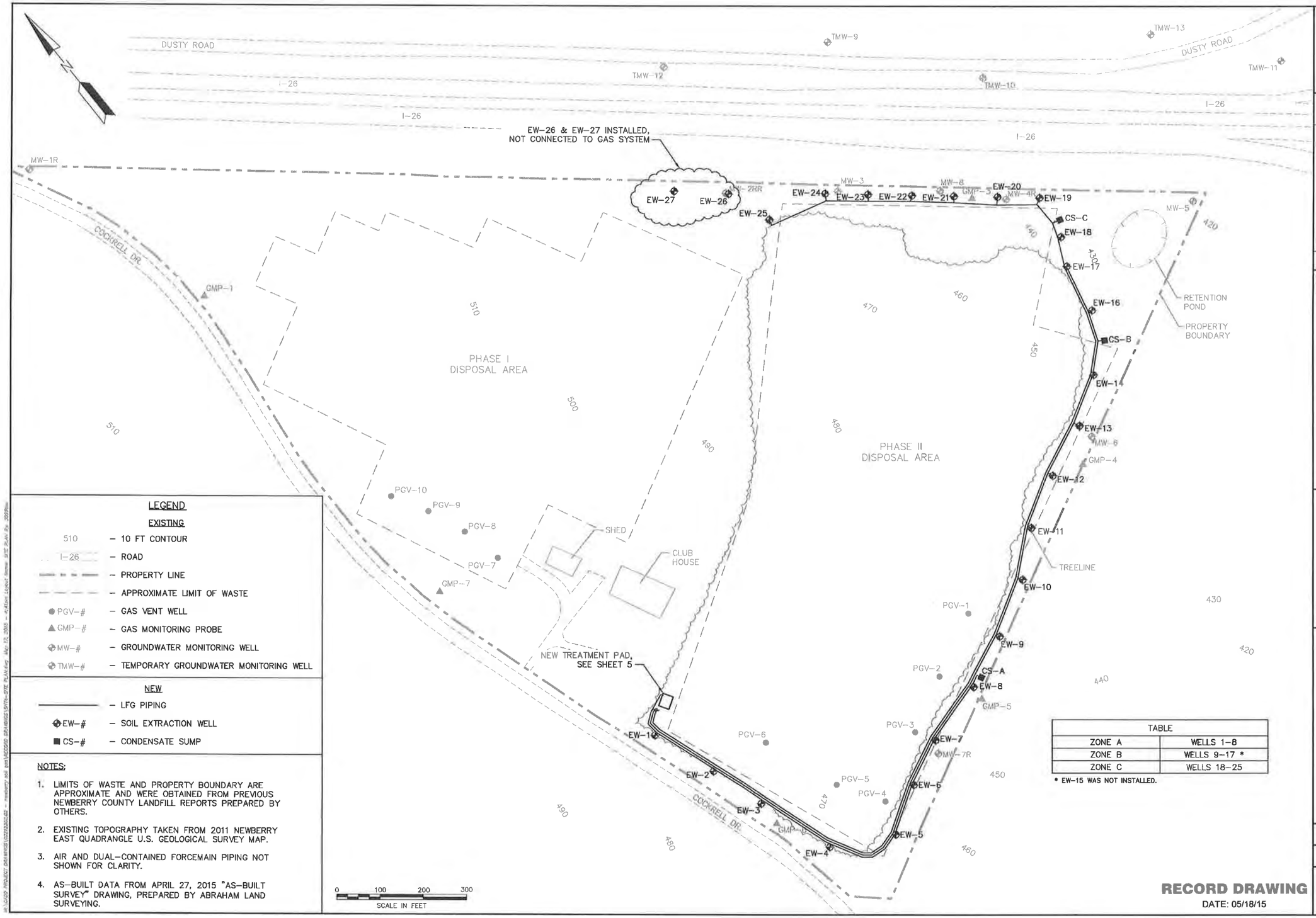
PROJ. NO. 02212302.02 | DSN. BY: SCL | DWN. BY: MPP/TAS | CHK. BY: ADG | QA RVW BY: JLM | APP. BY: SCL

DATE: MAY 2015

SCALE: AS SHOWN

DRAWING NO. 3 of 12



LEGEND

EXISTING

- 510 – 10 FT CONTOUR
- I-26 – ROAD
- – PROPERTY LINE
- – APPROXIMATE LIMIT OF WASTE
- PGV-# – GAS VENT WELL
- GMP-# – GAS MONITORING PROBE
- MW-# – GROUNDWATER MONITORING WELL
- TMW-# – TEMPORARY GROUNDWATER MONITORING WELL

NEW

- – LFG PIPING
- EW-# – SOIL EXTRACTION WELL
- CS-# – CONDENSATE SUMP

NOTES:

1. LIMITS OF WASTE AND PROPERTY BOUNDARY ARE APPROXIMATE AND WERE OBTAINED FROM PREVIOUS NEWBERRY COUNTY LANDFILL REPORTS PREPARED BY OTHERS.
2. EXISTING TOPOGRAPHY TAKEN FROM 2011 NEWBERRY EAST QUADRANGLE U.S. GEOLOGICAL SURVEY MAP.
3. AIR AND DUAL-CONTAINED FORCEMAIN PIPING NOT SHOWN FOR CLARITY.
4. AS-BUILT DATA FROM APRIL 27, 2015 "AS-BUILT SURVEY" DRAWING, PREPARED BY ABRAHAM LAND SURVEYING.

0 100 200 300
SCALE IN FEET

TABLE	
ZONE A	WELLS 1-8
ZONE B	WELLS 9-17 *
ZONE C	WELLS 18-25

* EW-15 WAS NOT INSTALLED.

RECORD DRAWING
DATE: 05/18/15

NO.	REVISION	DATE

SHEET TITLE: **REMEDIATION SITE PLAN**

PROJECT TITLE: **SOIL GAS REMEDIAL DESIGN NEWBERRY COUNTY LANDFILL**

CLIENT: **NEWBERRY COUNTY**
PO BOX 156
NEWBERRY, SC 29108

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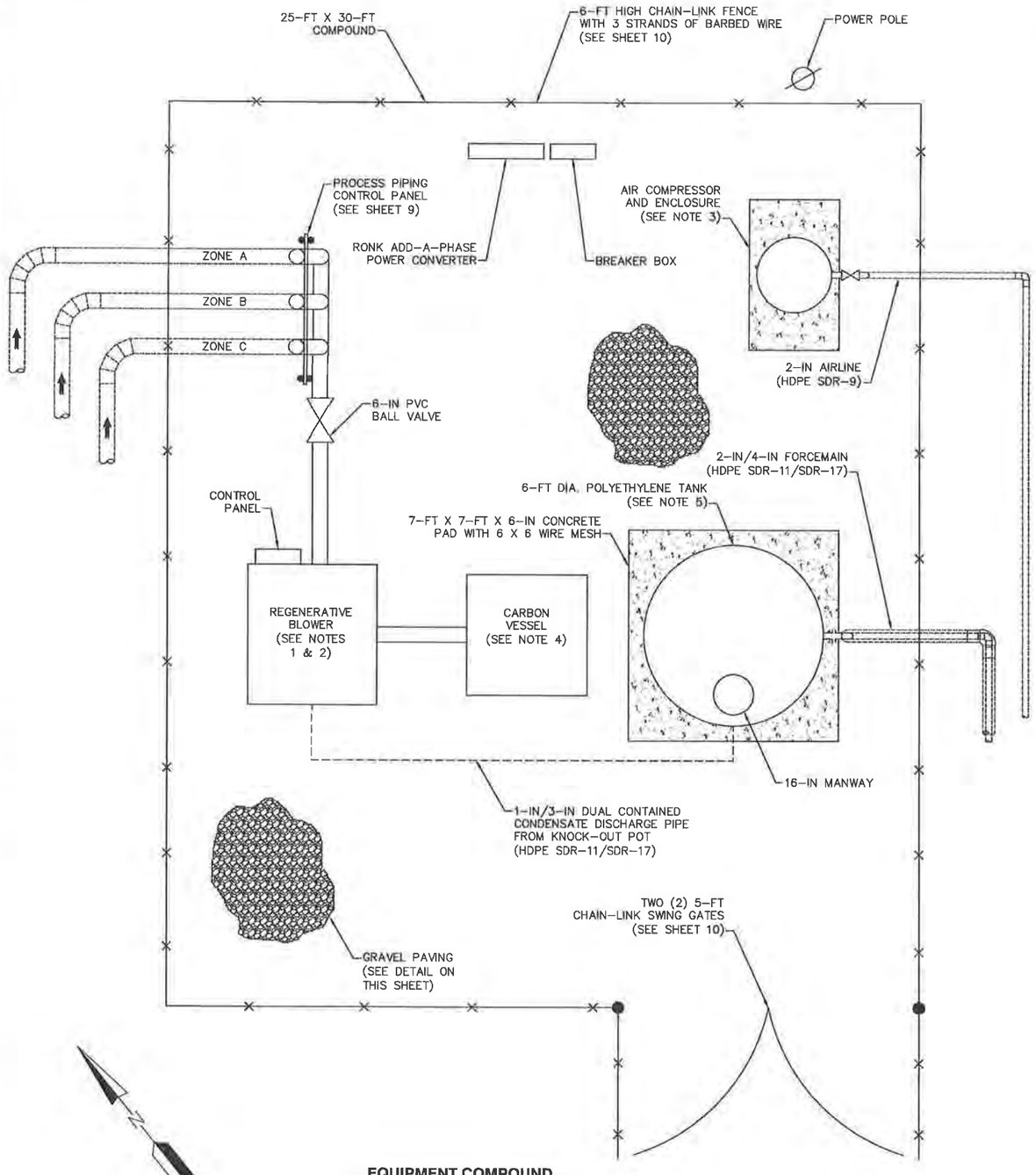
PROJ. NO. 02271302.02
DSN. BY: SCL
DWN. BY: TAS
CHK. BY: ADG
QA REVIEW BY: MM
APPROVED BY: SCL

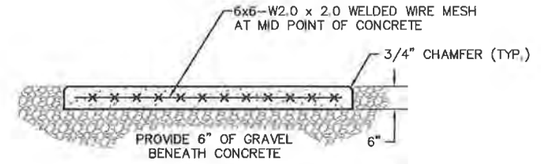
DATE: MAY 2015
SCALE: AS SHOWN
DRAWING NO. 4 of 12



EQUIPMENT COMPOUND
NTS

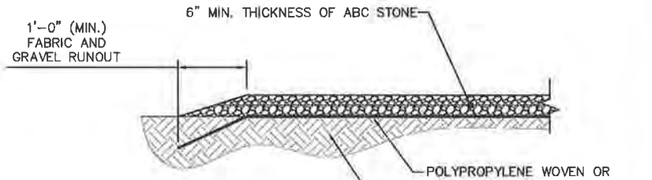
EQUIPMENT COMPOUND NOTES:

1. REGENERATIVE BLOWER IS A GEOTECH SVE SYSTEM PROVIDED BY GEOTECH ENVIRONMENTAL EQUIPMENT, INC. (303) 320-4764 (PART REF. #B609005658). BLOWER MOTOR IS A 10-HP, 230V, 3 PHASE XP WITH THERMAL OVERLOAD PROTECTION. ALUMINUM FAN REGENERATIVE BLOWER, AMETEK ROTRON MODEL #EN858BD72WL, 150-400 ICFM, MAX VAC. 90" W.C. THE UNIT SHALL INCLUDE:
   A. MANUAL DILUTION AIR VALVE.
   B. PARTICULATE AIR FILTER.
   C. TWO VACUUM GAUGES.
   D. HIGH VACUUM SWITCH TO PROTECT BLOWER FROM OVER HEATING.
   E. 37-GALLON MOISTURE SEPARATOR WITH HIGH LIQUID LEVEL SWITCH THAT WILL SHUT DOWN BLOWER.
   F. 1/2-HP EFFLUENT TRANSFER PUMP.
   G. NEMA 4 CONTROLLER TO OPERATE SYSTEM MOUNTED TO EXTERIOR OF CONTAINER.
   H. SENSAPHONE MODEL 400 AUTODIALER MOUNTED INSIDE OF CONTAINER.
2. ALL EQUIPMENT IS MOUNTED, WIRED AND PLUMBED INTO A 16 GAUGE, WELDED STEEL CONTAINER. THE VESSEL ALSO INCLUDES A LOCKABLE, HINGED, SIDE DOOR FOR ACCESS.
3. AIR COMPRESSOR IS AN INGERSOLL RAND (#2475N5), 5-HP, MAX PRESSURE 175 PSI, 230V, 1 PHASE, RECEIVER TANK IS 80-GAL. AN ENCLOSURE IS PROVIDED TO PROTECT THE COMPRESSOR FROM RAIN.
4. VAPOR PHASE CARBON VESSEL IS CAPABLE OF A FLOW UP TO 500 SCFM, 1000-POUND CAPACITY. TYPICAL DIMENSIONS ARE 4-FT X 4-FT X 4-FT.
5. POLY TANK IS A 1,000 GALLON DOUBLE WALL CROSS LINKED POLYETHYLENE (XLPE) AND INCLUDES ALL FLANGES AND A 16-IN MANWAY.



NOTES:
1. SUBGRADE BENEATH CONCRETE SHALL BE UNIFORMLY COMPACTED TO MINIMUM 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY.
2. PROVIDE 6" OF GRAVEL BENEATH CONCRETE.

CONCRETE PAD DETAIL
NTS



GEOTEXTILE SPECIFICATION (MARV VALUE)

MEETS AASHTO M288 CLASS 2 REQUIREMENTS.
GRAB TENSILE STRENGTH (MIN.) = 160 lbs.
GRAB ELONGATION (MIN.) = 50 %
PUNCTURE STRENGTH (MIN.) = 85 lbs.
MULLEN BURST (MIN.) = 280 psi
TRAPEZOIDAL TEAR (MIN.) = 60 lbs.
PERMITTIVITY (MIN.) = 1.30 SEC-1

GRAVEL PAVING DETAIL
NTS

RECORD DRAWING
DATE: 05/18/15

NO.	REVISION	DATE

SHEET TITLE: TREATMENT COMPOUND PLAN

PROJECT TITLE: SOIL GAS REMEDIAL DESIGN
NEWBERRY COUNTY LANDFILL

CLIENT: NEWBERRY COUNTY
PO BOX 156
NEWBERRY, SC 29108

SCS ENGINEERS
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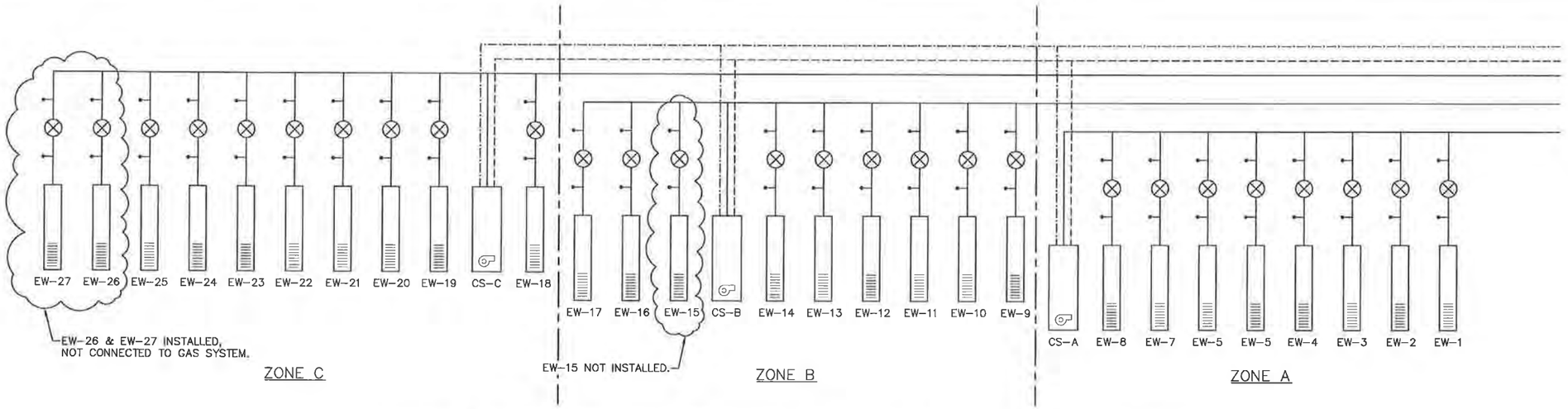
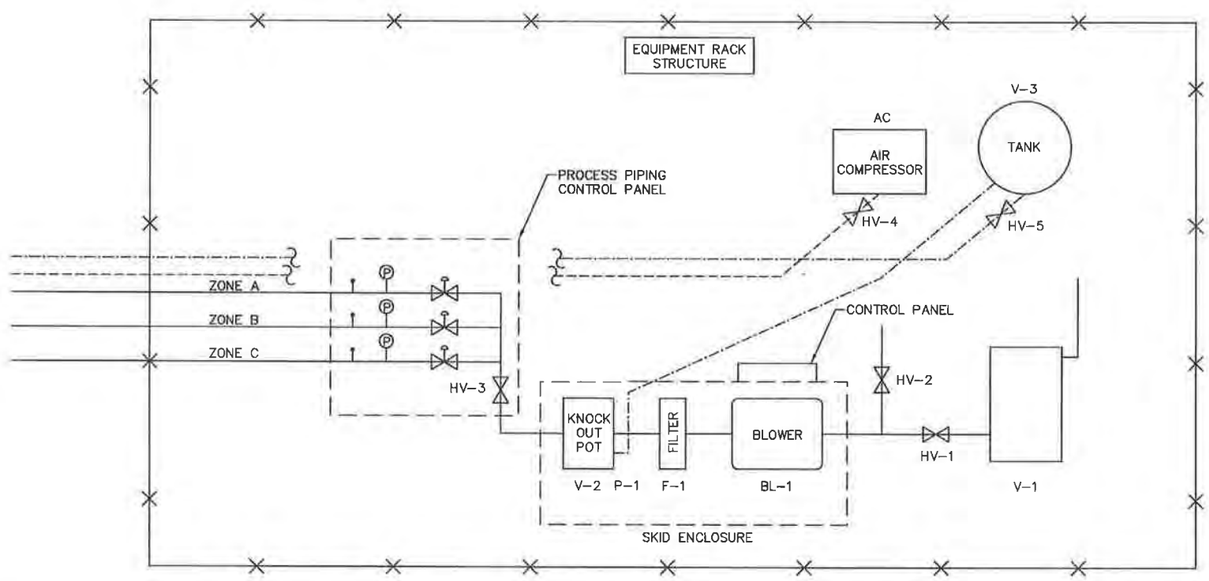
PROJ. NO: 02212502.02
DSN BY: SCL
DWN BY: MPP/TAS
CHK BY: ADG
QA/QC BY: JLM
APP BY: SCL

DATE: MAY 2015
SCALE: AS SHOWN
DRAWING NO: 5 of 12





NOTES:

1. REFER TO SHEET 5 FOR PIPING AND EQUIPMENT ORIENTATION.
2. REFER TO SHEETS E1 AND E2 FOR ELECTRICAL INFORMATION.

LEGEND

- SOIL GAS EXTRACTION WELL
- CONDENSATE SUMP WITH PNUEMATIC PUMP
- WELLHEAD GATE VALVE
- SAMPLE PORT
- MAGNEHELIC GAUGE (0"–100" W.C.)
- DUAL CONTAINED FORCEMAIN
- AIRLINE
- HEADER PIPE
- HAND VALVE
- MOTOR OPERATED CONTROL VALVE
- FENCE

EQUIPMENT

V–1	– VAPOR–PHASE ACTIVATED CARBON (1,000 POUNDS)
V–2	– KNOCK–OUT POT
V–3	– CONDENSATE STORAGE TANK (1,000–GALLON POLY TANK)
F–1	– FILTER
BL–1	– 10–HP BLOWER (AMETEK ROTRON #EN858BD72WL)
P–1	– TRANSFER PUMP (½–HP)
AC	– 5–HP RECIPROCATING AIR COMPRESSOR (INGERSOLL RAND #2475N5) WITH 80–GAL RECEIVER

PROCESS

1. V–2 AND V–3 ARE EQUIPED WITH HIGH LEVEL SWITCHES THAT WILL SHUT DOWN BLOWER.
2. V–2 IS EQUIPED WITH AN AUTOMATIC PUMP.

RECORD DRAWING
DATE: 05/18/15

NO.	REVISION	DATE

SHEET TITLE: PROCESS FLOW DIAGRAM AND P&ID

PROJECT TITLE: SOIL GAS REMEDIAL DESIGN
NEWBERRY COUNTY LANDFILL

CLIENT: NEWBERRY COUNTY
PO BOX 156
NEWBERRY, SC 29108

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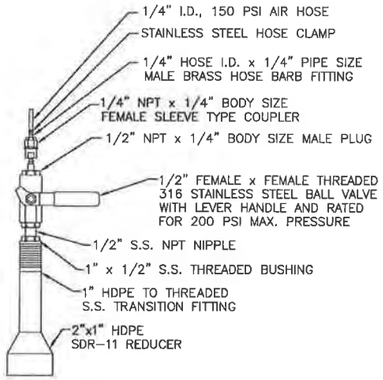
PROJ. NO. 02212002.02
DSN. BY: SCL
DWG. BY: ADG
CHK. BY: JLM
QA/QC BY: JLM
APP. BY: SCL

DATE: MAY 2015
SCALE: AS SHOWN
DRAWING NO. 6 of 12

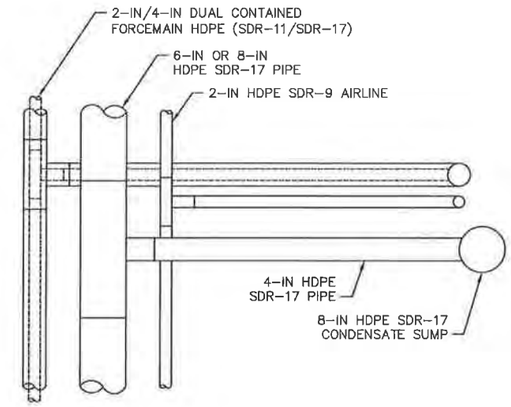
DRAFT WELL SCHEDULE

Well ID	Northing	Easting	Est. Ground Elevation "D"	Borehole Depth "D"	Slotted Pipe Length "A"	Solid Pipe Length Below Grade "B"
			(ft)	(ft)	(ft)	(ft)
EW-1	895,934.9	1,832,310.5	481	40	29	10
EW-2	895,783.3	1,832,361.7	477	40	29	10
EW-3	895,633.8	1,832,418.7	473	40	29	10
EW-4	895,484.3	1,832,475.7	468	40	29	10
EW-5	895,384.0	1,832,600.4	463	40	29	10
EW-6	895,441.3	1,832,717.1	458	35	24	10
EW-7	895,498.7	1,832,833.8	454	33	22	10
EW-8	895,556.0	1,832,950.5	452	33	22	10
EW-9	895,613.3	1,833,067.1	453	33	22	10
EW-10	895,670.6	1,833,183.8	452	33	22	10
EW-11	895,727.9	1,833,300.5	448	33	22	10
EW-12	895,785.3	1,833,417.2	445	33	22	10
EW-13	895,842.6	1,833,533.9	439	33	22	10
EW-14	895,895.5	1,833,641.6	436	30	19	10
EW-15	896,001.7	1,833,697.4	437	28	17	10
EW-16	896,088.7	1,833,674.5	439	26	15	10
EW-17	896,176.0	1,833,692.3	441	25	14	10
EW-18	896,239.8	1,833,769.4	434	25	14	10
EW-19	896,338.8	1,833,783.2	435	25	14	10
EW-20	896,402.9	1,833,706.5	442	25	14	10
EW-21	896,467.1	1,833,629.7	448	26	15	10
EW-22	896,531.2	1,833,553.0	453	27	16	10
EW-23	896,595.3	1,833,476.3	459	28	17	10
EW-24	896,659.4	1,833,399.5	461	30	19	10
EW-25	896,749.2	1,833,292.1	463	32	21	10
EW-26	896,839.0	1,833,184.7	466	35	24	10
EW-27	896,928.7	1,833,077.2	472	42	31	10
			TOTAL	870	573	270

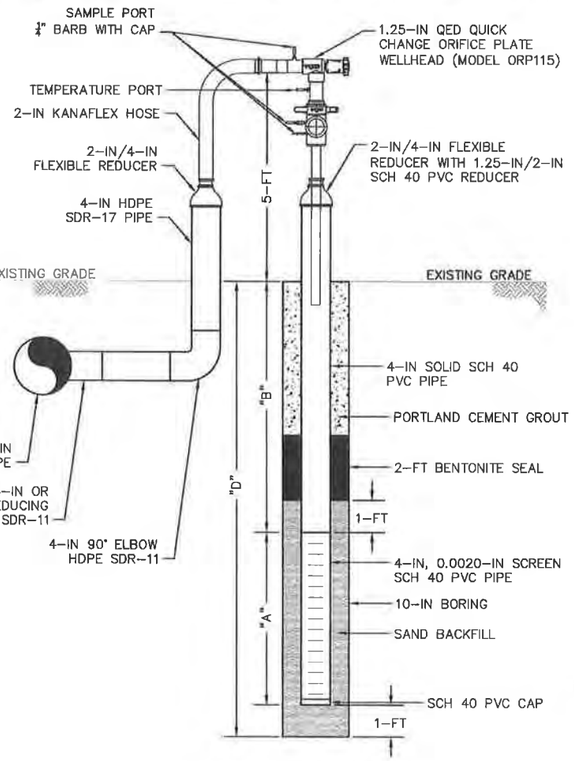
EW-15 NOT INSTALLED



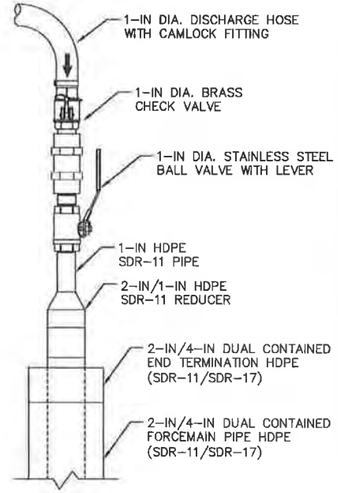
AIR SUPPLY LINE VALVE DETAIL
NTS



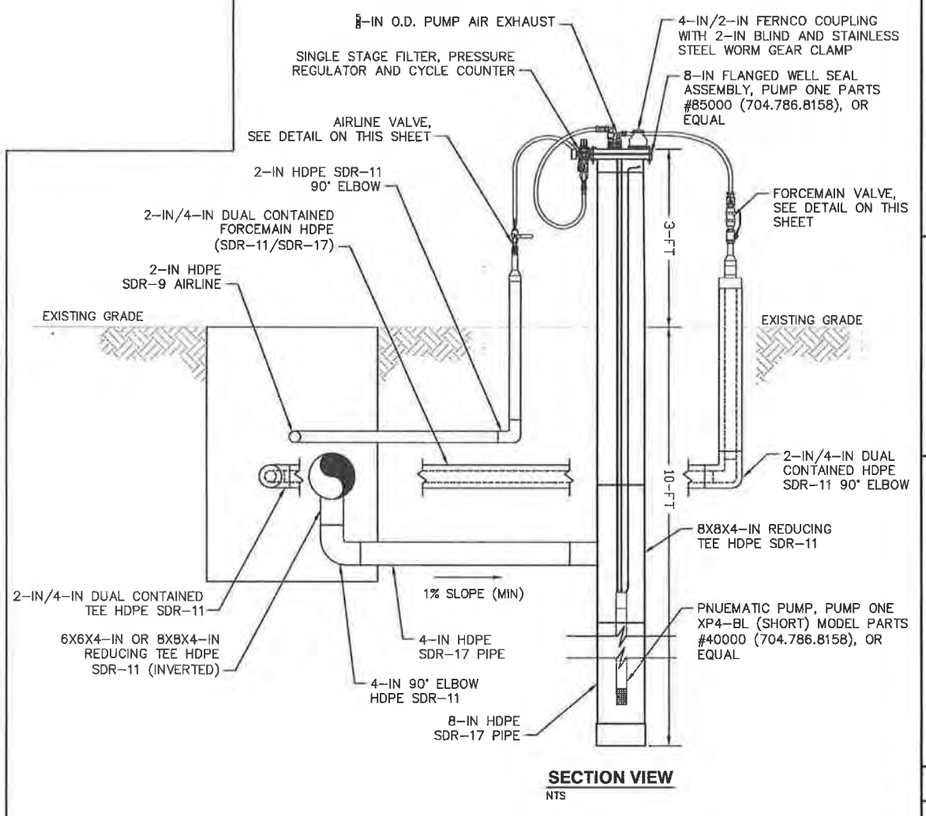
PLAN VIEW
NTS



EXTRACTION WELL DETAIL
NTS



FORCEMAIN VALVE DETAIL
NTS



SECTION VIEW
NTS

CONDENSATE SUMP DETAIL
NTS

RECORD DRAWING
DATE: 05/18/15

NO.	REVISION	DATE

SHEET TITLE: **EXTRACTION WELL DETAILS**

PROJECT TITLE: **SOIL GAS REMEDIAL DESIGN NEWBERRY COUNTY LANDFILL**

CLIENT: **NEWBERRY COUNTY**
PO BOX 156
NEWBERRY, SC 29108

SCS ENGINEERS
2520 WHITEHALL PARK DRIVE, SUITE 450
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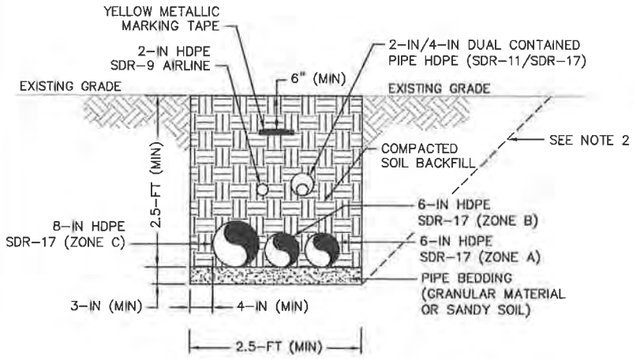
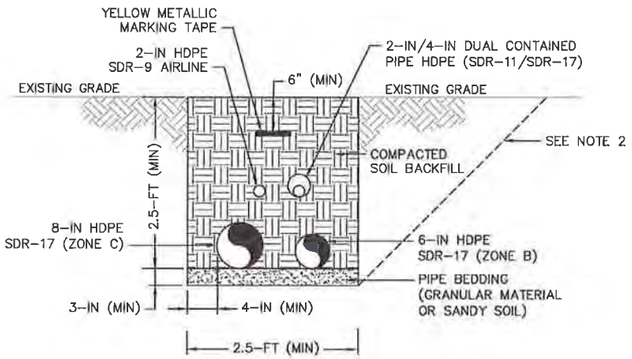
PHONE: (704) 504-3107 FAX: (704) 504-3174

PROJ. NO: 02271282.02
DSN. BY: SCL
DWN. BY: KAS
CHK. BY: ADG
QA RVW BY: JLM
APVD. BY: SCL

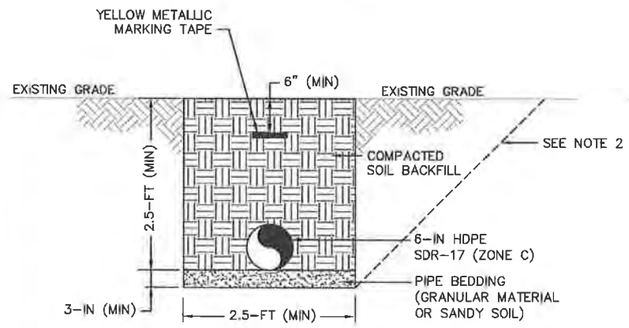
DATE: MAY 2015
SCALE: AS SHOWN
DRAWING NO. 7 of 12



TRENCH "A" DETAIL
NTS



TRENCH "B" DETAIL
NTS



TRENCH "C1" DETAIL
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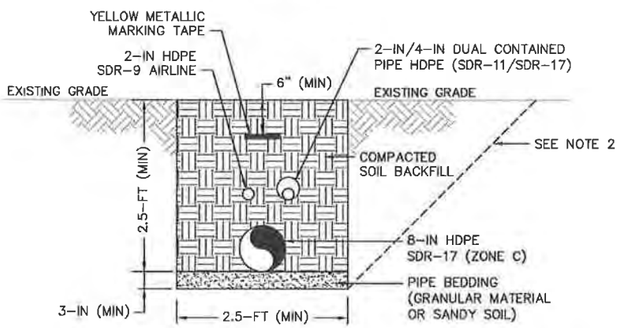
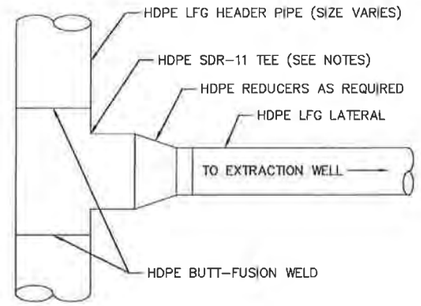


TRENCH "C2" DETAIL
NTS

NOTES:

1. TRENCHING AND EXCAVATION SHALL CONFORM WITH OSHA TRENCHING AND EXCAVATION REGULATIONS AS REVISED IN SUBPART P OF PART 1926 IN THE FEDERAL REGISTER.
2. EXCAVATIONS GREATER THAN 4 FEET, CUT SLOPE BACK AT 1H:1V MINIMUM SLOPE OR USE TRENCH BOX.
3. PIPING SHALL BE PLACED AT 0.5% MINIMUM SLOPE.

PIPE TRENCH DETAILS
NTS



NOTES:

1. HDPE MOLDED TEE SHALL BE USED TO TIE-IN 2"ø AND LARGER LFG LATERAL TO 8"ø HEADER AND SMALLER.
2. 1' MIN. OF SAND WILL BE PLACED BELOW EACH TEE. THE SAND WILL BE INSTALLED SO IT EXTENDS 3' MIN. IN EACH DIRECTION OF THE TEE. SAND WILL BE SLIGHTLY MOISTENED AND HAND-TAMPED PROVIDING SUPPORT TO ALL POINTS OF THE TEE. CLEAN GRADED SOIL WILL BE HAND-TAMPED ABOVE THE TEE (1' MIN.) BEING DILIGENT TO ELIMINATE ALL VOIDS.

LATERAL TIE-IN WITH TEE DETAIL
NTS

Temporary Seeding - Upstate

Species	lbs/Ac	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Browntop Millet (Alone)	40												
Browntop Millet (Mix)	10												
Rye Grain (Alone)	56												
Rye Grain (Mix)	10												
Rye Grass (Alone)	50												
Rye Grass (Mix)	8												
For Steep Slopes/Cut Slopes													
Weeping Lovegrass (Alone)	4												
Weeping Lovegrass (Mix)	2												

Permanent Seeding - Upstate

Species	Lbs/Ac	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Bahia Grass (Alone)	40												
Bahia Grass (Mix)	30												
Bermuda Grass (hulled) (Alone)	8-12												
Bermuda Grass (hulled) (Mix)	4-6												
Fescue, Tall (KY31) Alone	40												
Fescue, Tall (KY31) mix	20												
Sericea Lespedeza (Scarified) Alone or Mix (inoculate with EL Inoculant	40												
Ladino Clover (mix only) Inoculate with Alfi Inoculant	2												
For Steep Slopes/Cut Slopes													
Weeping Lovegrass (Alone)	4												
Weeping Lovegrass (Mix)	2												
Crownvetch (Mix) (Inoculate with Type M Inoculation	8-10												

SEEDING DETAILS
NTS

SOIL AMENDMENTS

APPLY LIME AND FERTILIZER ACCORDING TO SOIL TESTS, IF NOT AVAILABLE APPLY 4,000 LBS/ACRE GROUND AGRICULTURAL LIMESTONE AND 1,000 LBS/ACRE 10-10-10 FERTILIZER

MULCH

APPLY 4,000-5,000 LBS/ACRE GRAIN STRAW OR EQUIVALENT COVER MATERIAL. ANCHOR COVER MATERIAL BY TACKING WITH ASPHALT, ROVING, OR NETTING. NETTING IS THE PREFERRED ANCHORING METHOD ON STEEP SLOPES.

MAINTENANCE

TEMPORARY – REFERTILIZE IF GROWTH IS NOT FULLY ADEQUATE. RESEED, REFERTILIZE AND COVER IMMEDIATELY FOLLOWING EROSION REPAIRS.
PERMANENT – REFERTILIZE IN THE SECOND YEAR UNLESS GROWTH IS FULLY ADEQUATE. MAY BE MOWED ONCE OR TWICE A YEAR, BUT MOWING IS NOT NECESSARY. RESEED, FERTILIZE, AND COVER DAMAGED AREAS IMMEDIATELY.

RECORD DRAWING
DATE: 05/18/15

NO.	REVISION	DATE

SHEET TITLE: **PIPING DETAILS**

PROJECT TITLE: **SOIL GAS REMEDIAL DESIGN NEWBERRY COUNTY LANDFILL**

CLIENT: **NEWBERRY COUNTY**
PO BOX 156
NEWBERRY, SC 29108

SCS ENGINEERS
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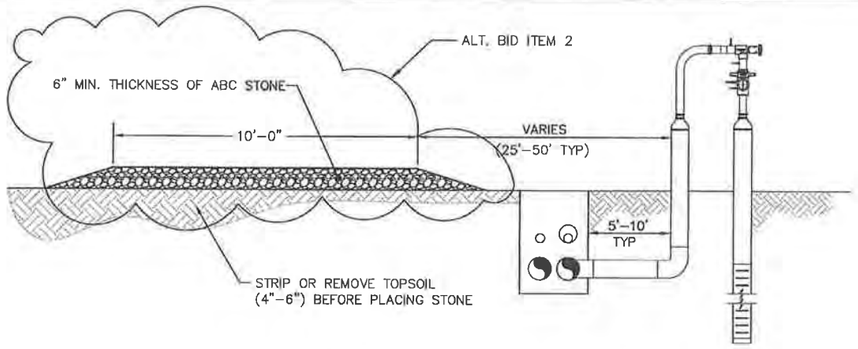
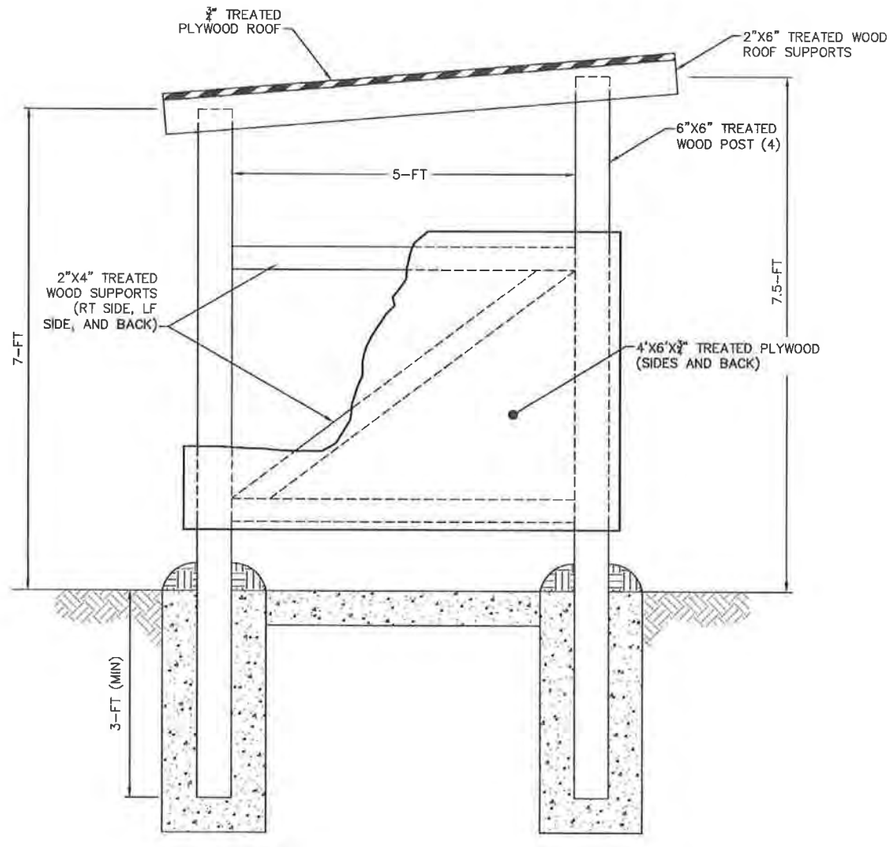
PROJ. NO: 02212502.02
DSN. BY: SCL
DWN. BY: TAS
CHK. BY: ADG
QA/QC BY: JLM
APP. BY: SCL

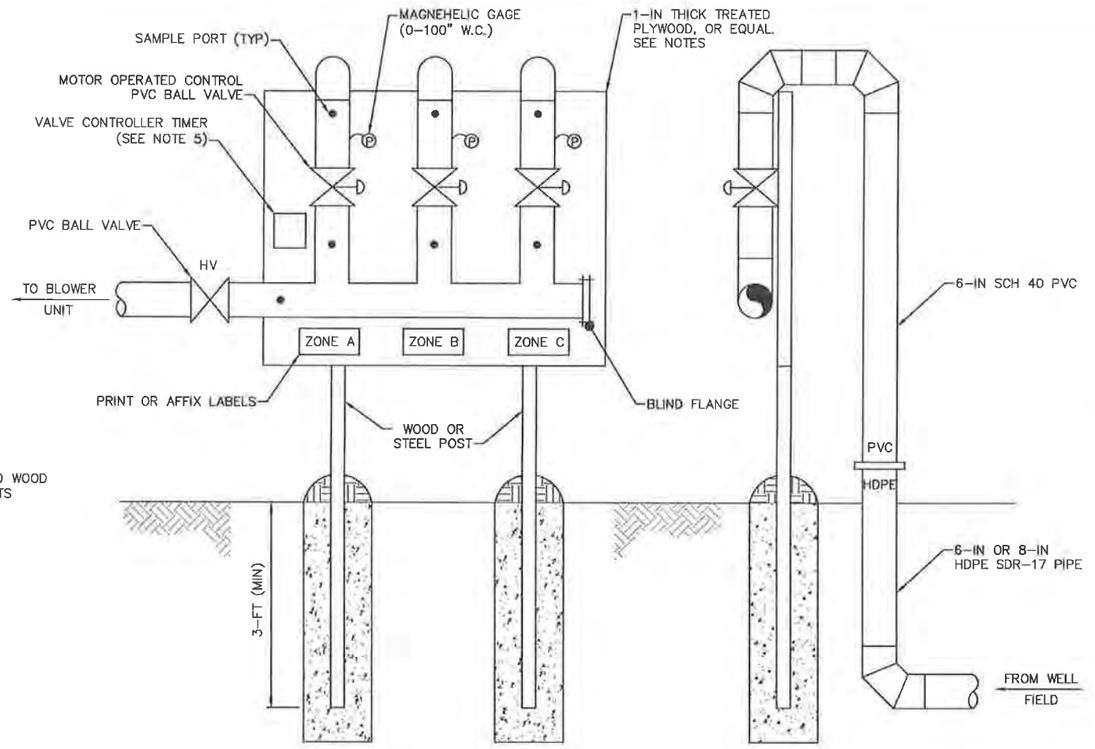
DATE: MAY 2015
SCALE: AS SHOWN
DRAWING NO. 8 of 12



ACCESS ROAD DETAIL
NTS



AIR COMPRESSOR SHED DETAIL
NTS



FRONT VIEW **SECTION VIEW**

NOTES:

1. CONTRACTOR SHALL PREPARE AND SUBMIT SHOP DRAWING FOR PROCESS PIPING CONTROL PANEL.
2. CONTRACTOR MAY PROPOSE OTHER MATERIALS.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR ADEQUATE PIPE SUPPORTS, AS NEEDED.
4. ALL PVC PIPE SHALL BE SCH 40. ALL PVC PIPE SHALL BE PAINTED FOR UV PROTECTION.
5. THE THREE MOTOR OPERATED CONTROL VALVES SHALL BE CONNECTED TO A CONTROLLER/TIMER. THE CONTROLLER/TIMER SHOULD BE ABLE TO "OPEN" AND "CLOSE" EACH VALVE AT A SET TIME/DAY.

PROCESS PIPING CONTROL PANEL DETAIL
NTS

RECORD DRAWING
DATE: 05/18/15

NO.	REVISION	DATE

SHEET TITLE: **STRUCTURAL DETAILS**

PROJECT TITLE: **SOIL GAS REMEDIAL DESIGN**
NEWBERRY COUNTY LANDFILL

CLIENT: **NEWBERRY COUNTY**
PO BOX 156
NEWBERRY, SC 29108

SCS ENGINEERS
2520 WHITEHALL PARK DRIVE, SUITE 450
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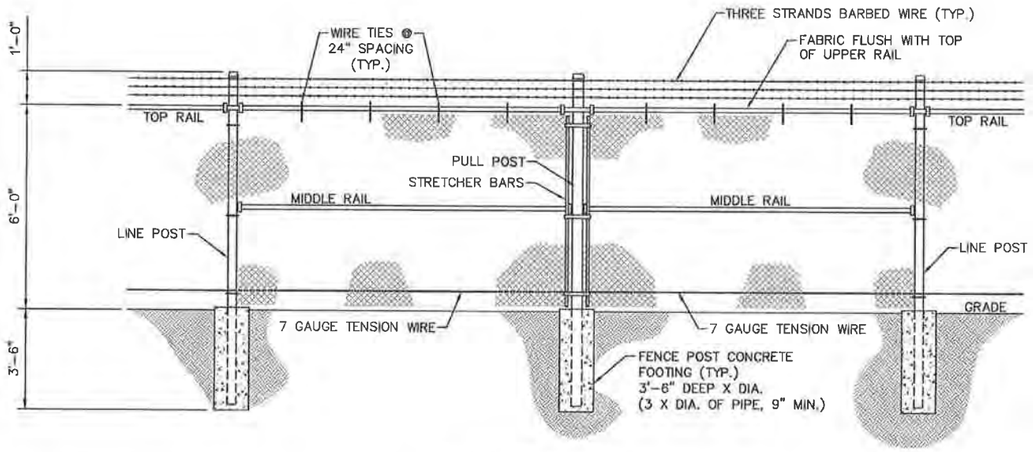
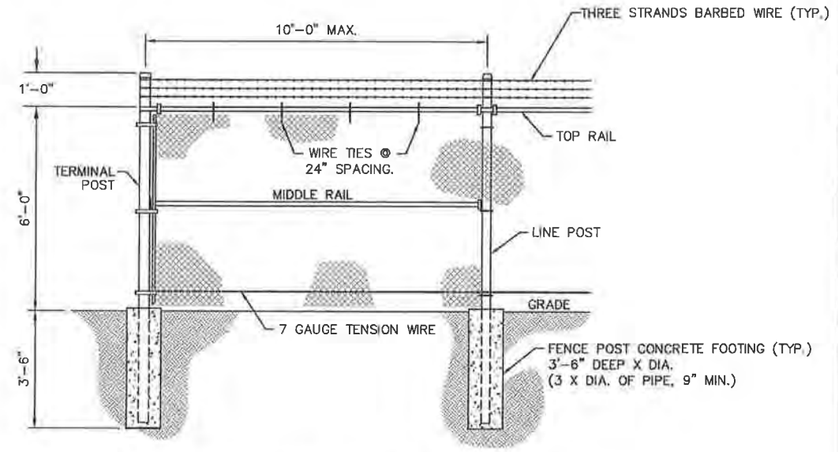
PHONE: (704) 504-3107 FAX: (704) 504-3174

PROJ. NO. 02212002.02
DSN. BY: SCL
DWN. BY: TAS
CHK. BY: ADG
QUA RVW BY: ALM
APP. BY: SCL

DATE: MAY 2015
SCALE: AS SHOWN
DRAWING NO. 9 of 12

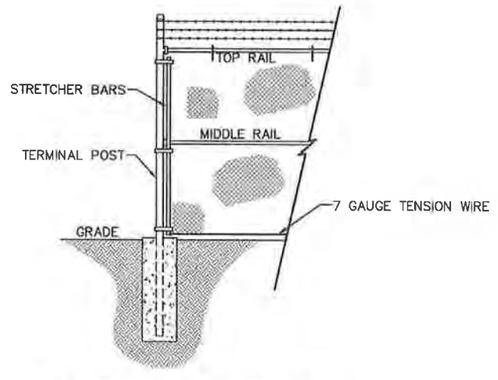


FENCE DETAIL
NTS

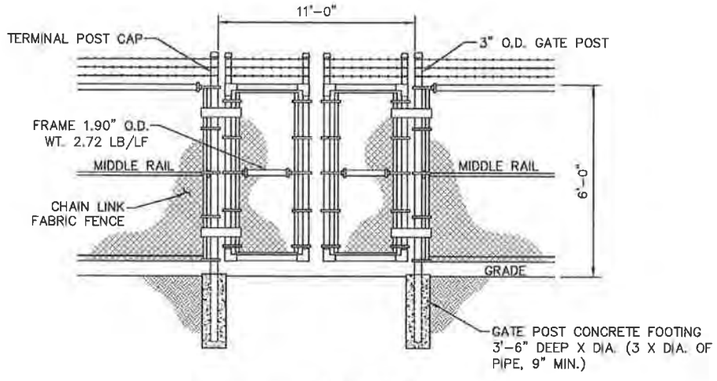


FENCE CORNER DETAIL
NTS

SPECIFICATIONS FOR FENCE	
PULL POSTS	3" O.D. PIPE
LINE POSTS	2 3/8" O.D. PIPE
TOP AND MIDDLE RAILS	1 5/8" O.D. PIPE
CHAINLINK FENCE FABRIC	9 GA. 2" MESH GALVANIZED AFTER WEAVING CLASS II
CONCRETE COMPRESSIVE STRENGTH	3,000 PSI MIN. AT 28-DAYS



PULL POST ASSEMBLY DETAIL
NTS



10 FOOT DOUBLE SWING GATE - TRUSS TYPE DETAIL
NTS

RECORD DRAWING
DATE: 05/18/15

NO.	REVISION	DATE
	ADDENDUM NO. 2	12/11/14

SHEET TITLE: **FENCE DETAILS**

PROJECT TITLE: **SOIL GAS REMEDIAL DESIGN NEWBERRY COUNTY LANDFILL**

CLIENT: **NEWBERRY COUNTY**
PO BOX 156
NEWBERRY, SC 29108

SCS ENGINEERS
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PHONE: (704) 504-3107 FAX: (704) 504-3174

PROJ. NO. 02217202.22 | DSN. BY: SCL | DWN. BY: TAS | CHK. BY: ADG | QA REVW BY: JLM | QA/QC BY: SCL

DATE: MAY 2015

SCALE: AS SHOWN

DRAWING NO.
10 of **12**

SYMBOL	DESCRIPTION
A-1,3	HOME RUN TO LIGHTING/SERVICE PANEL. HASH MARKS, WHEN SHOWN, INDICATE NUMBERS OF CONDUCTORS. "/ " INDICATES HOT WIRE, "/V " INDICATES NEUTRAL CONDUCTOR," ρ " INDICATES GROUND CONDUCTOR. HOME RUN NOTE INDICATES PANEL NAME AND CIRCUIT NAME OR FEEDER TAG. CONDUCTORS SHALL BE #12 AWG IN 3/4" CONDUIT UNLESS NOTED OTHERWISE. ANY HOME RUN OR CONDUIT WITHOUT HASH MARKS IS TO CONTAIN 3 CONDUCTORS; 1 HOT, 1 NEUTRAL, AND 1 EQUIPMENT GROUND, EACH HOT CIRCUIT SHALL BE PAIRED WITH A SEPARATE NEUTRAL CONDUCTOR. SHARING OF NEUTRAL CONDUCTORS BETWEEN CIRCUITS IS NOT ALLOWED.
	EXPOSED CONDUIT
	CONDUIT RUN IN SLAB OR UNDERGROUND.
	CONDUIT JUNCTION IN CONDULET OR JUNCTION BOX.
	LIGHTING OR SERVICE PANEL, SURFACE MOUNTED.(240/120V)
NEMA 1 30/20/3P	COMBINATION STARTER, NEMA SIZE NOTED, WITH FUSED DISCONNECT SIZE SHOWN. STARTER TO BE FVNR, UNLESS NOTED OTHERWISE, WITH HOA SWITCH AND 1-N.O., 1-N.C. AUXILLARY CONTACTS. SQ. D OR EQUAL.
	CONNECTION TO A SPECIFIC PIECE OF EQUIPMENT. COORDINATE EXACT LOCATION AND REQUIREMENTS WITH PROVIDER / INSTALLER OF THE EQUIPMENT.

WIRING DEVICES

NOTE: ALL WIRING DEVICES TO BE IVORY, WITH #302 STAINLESS STEEL COVERPLATE (FLUSH MOUNTED) UNLESS NOTED OTHERWISE ON THE DRAWING OR SPECIFICATIONS.

STRAIGHT BLADE DEVICE SYMBOLS

SYMBOL	DESCRIPTION
GFI, WP	20A, 125V, 2P, 3W, NEMA 5-20R, DUPLEX RECEPTACLE. HUBBELL 5362-I OR EQUAL. STANDARD POWER. "WP" DENOTES WEATHERPROOF COVER PLATE. "GFI" DENOTES GFCI TYPE.

ABBREVIATIONS:

AFG	ABOVE FINISHED GRADE
CU	COPPER
EC	ELECTRICAL CONTRACTOR
FU	FUSE
FWE	FURNISHED WITH EQUIPMENT
GFI	GROUND FAULT INTERRUPTER DEVICE
MCB	MAIN CIRCUIT BREAKER
MFR	MANUFACTURER
NTS	NOT TO SCALE
RGS	RIGID GALVANIZED STEEL
SW	SWITCH
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
UGND	UNDERGROUND
W/	WITH
WP	WEATHER PROOF

ELECTRICAL GENERAL NOTES:

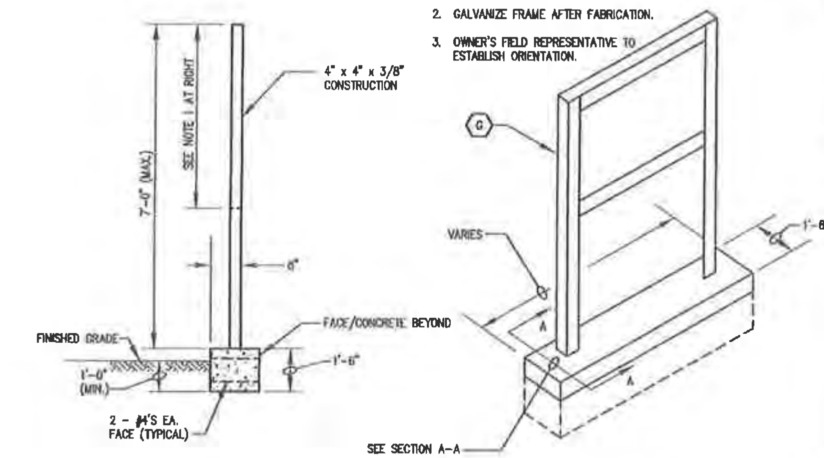
1. INSPECT SITE PRIOR TO SUBMITTING BID. DRAWINGS ARE INTENDED TO COVER THE REQUIRED ELECTRICAL SYSTEMS. DRAWINGS MAY NOT SHOW COMPLETE OR ACCURATE DETAILS OF THE BUILDING OR SYSTEM IN EVERY RESPECT. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO OBTAIN ANY ADDITIONAL INFORMATION AS REQUIRED.
2. CONFORM TO THE NATIONAL ELECTRICAL CODE (2011), IBC (2012), IECC (2009), APPLICABLE NEMA, ANSI AND IEEE PUBLICATIONS, U.L. AND ADA STANDARDS AND OSHA REQUIREMENTS. COMPLY WITH LOCAL, COUNTY, STATE AND NATIONAL CODES HAVING JURISDICTION.
3. FURNISH AND INSTALL ALL MATERIALS IN A NEAT AND WORKMANLIKE FASHION. ALL MATERIALS SHALL BE NEW, WITH FIRST QUALITY AND UL LABEL.
4. VERIFY ALL DIMENSIONS AND CLEARANCES PRIOR TO INSTALLATION OF EQUIPMENT AND RACEWAYS. CONTRACTOR IS RESPONSIBLE FOR COORDINATION OF WORK WITH THAT OF ALL OTHER TRADES AS REQUIRED.
5. CONDUIT SHALL BE RGS FOR BRANCH CIRCUIT WIRING AS ALLOWED BY NEC. MINIMUM CONDUIT SIZE SHALL BE 3/4". ALL CONDUCTORS SHALL BE TYPE THHN/THWN, STRANDED 600V COPPER BUILDING WIRE. MINIMUM SIZE SHALL BE #12 AWG COPPER UNLESS NOTED. UNDERGROUND CONDUITS SHALL BE PVC SCHEDULE 40 WITH TRANSITION TO RIGID GALVANIZED STEEL BELOW GRADE FOR EXPOSED CONDUITS.
6. PROVIDE GROUNDING FOR ALL EQUIPMENT IN ACCORDANCE WITH ARTICLE 250 OF THE NATIONAL ELECTRICAL CODE. GROUND SERVICE TO DRIVEN GROUND ROD.
7. ALL ENCLOSURES SHALL BE OF THE NEMA TYPE WHICH IS SUITABLE FOR THE APPLICATION.
8. ALL WORK SHALL HAVE PROPER LABELING AND NAMEPLATES. ALL CIRCUITS SHALL BE LABELED AT PANELS AND BOXES AS INDICATED. ALL PANELS AND DISCONNECTS ARE TO BE PERMANENTLY MARKED WITH NAME OR EQUIPMENT SERVED. ALL PANELS ARE TO BE PROVIDED WITH TYPEWRITTEN PANEL SCHEDULES.
9. COORDINATE WITH ELECTRICAL UTILITY AS REQUIRED FOR SERVICE ENTRY. INSTALL METER AND CONDUITS PER UTILITY REQUIREMENTS AND PAY ALL REQUIRED FEES OR CHARGES FOR SERVICES SHOWN.
10. THOROUGHLY CLEAN ALL EQUIPMENT AND SYSTEMS BEFORE PLACING IN OPERATION. RESTORE FINISHED SURFACES IF DAMAGED AND DELIVER THE ENTIRE INSTALLATION IN AN APPROVED CONDITION. INSTRUCT THE OWNERS' PERSONNEL IN THE PROPER OPERATION AND MAINTENANCE OF THE SYSTEMS. FURNISH TO THE OWNER THREE SETS OF OPERATION AND MAINTENANCE MANUALS FOR EACH SYSTEM.
11. GUARANTEE THE WORK INSTALLED FOR A PERIOD OF ONE YEAR AFTER DATE OF FINAL ACCEPTANCE. DEFECTS WHICH APPEAR AS A RESULT OF NORMAL USAGE SHALL BE REMEDIED BY THE CONTRACTOR TO THE COMPLETE SATISFACTION OF THE OWNER WITHOUT COST TO THE OWNER.
12. CONTRACTOR SHALL KEEP CURRENT A SET OF PLANS FOR THE DURATION OF CONSTRUCTION WITH ALL CHANGES TO WORK NEATLY AND ACCURATELY MARKED IN RED AND SHALL TURN OVER TO OWNER AT COMPLETION OF PROJECT.
13. ALL ELECTRICAL EQUIPMENT SHALL BE INSTALLED TO MEET SEISMIC REQUIREMENTS OF 2012 IBC AND SHALL BE SUBJECT TO SPECIAL INSPECTION REQUIREMENTS, CHAPTER 17 OF 2012 IBC AS IT RELATES TO ELECTRICAL EQUIPMENT. CONTRACTOR SHALL PROVIDE DRAWINGS FOR ALL INSTALLATION METHODS AND MEET ALL REQUIREMENTS PER AUTHORITY HAVING JURISDICTION.
14. ALL PANELBOARDS SHALL BE FURNISHED WITH COPPER BUS BARS AND A COPPER GROUNDING BUS BAR.

PANEL A — VOLTAGE 240/120, 1φ, 3W — CABINET SURFACE MOUNTED — FEEDER BOTTOM — TYPE SQ. D NQ, NEMA 3R — MAINS 125A MCB, SERVICE RATED

AMPS TRIP	POLES	NOTES	DESIGNATION	No.	PHASE LOAD øA		PHASE LOAD øB		No.	DESIGNATION	NOTES	POLES	AMPS TRIP
90	2		BLOWER SKID	1	6000				2	SPARE		1	20
				3			6000	180	4	RECEPTACLE		1	20
60	2		AIR COMPRESSOR (5 HP)	5	3300	0			6	SPARE		1	20
				7			3300		8	SPACE			
			SPACE	9					10	SPACE			
			SPACE	11					12	SPACE			
			SPACE	13					14	SPACE			
			SPACE	15					16	SPACE			
			SPACE	17					18	SPACE			
			SPACE	19					20	SPACE			
			SPACE	21					22	SPACE			
			SPACE	23					24	SPACE			
			SPACE	25					26	SPACE			
			SPACE	27					28	SPACE			
			SPACE	29					30	SPACE			
INTEGRATED EQUIPMENT RATING: 10,000 AIC				KVA TOTAL	9 4		9 5		PANELBOARD KVA LOAD TOTAL:			18 9	

SUPPORT DETAIL NOTES:

1. COORDINATE WITH ACTUAL DIMENSIONS OF EQUIPMENT USED.
2. GALVANIZE FRAME AFTER FABRICATION.
3. OWNER'S FIELD REPRESENTATIVE TO ESTABLISH ORIENTATION.



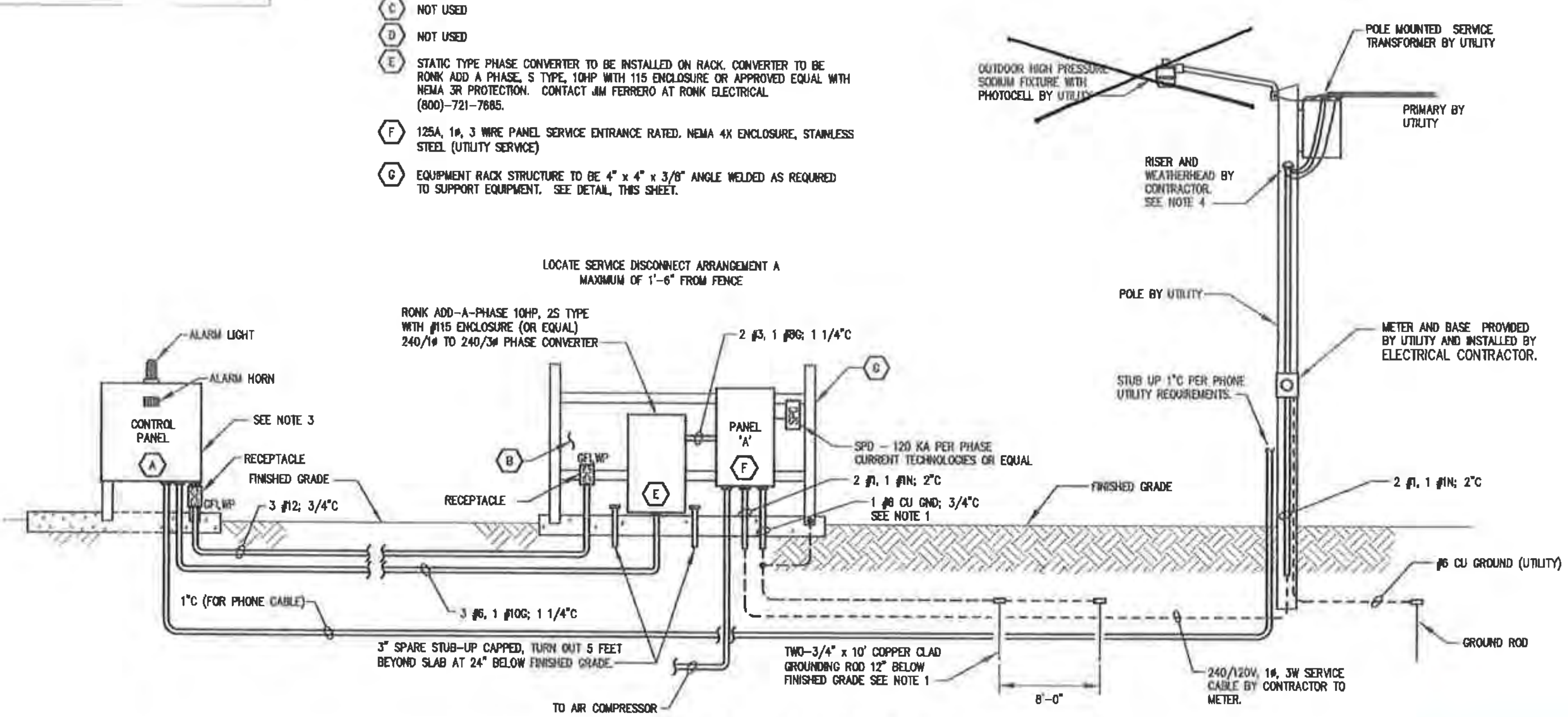
SECTION A-A

TYPICAL PANEL AND RACK SUPPORT DETAILS (2/E1)

NOT TO SCALE

EQUIPMENT LIST:

- (A) PRE-WIRED SKID MOUNT BLOWER PUMP CONTROL PANEL IN NEMA 4X SS ENCLOSURE AND MOUNTED ON SKID FRAME SEE CIVIL DRAWINGS FOR EXACT PANEL LOCATION.
- (B) 12"x16"x1/8" (H.D. GALVANIZED STEEL BACKPLATE WELDED TO EQUIPMENT RACK).
- (C) NOT USED
- (D) NOT USED
- (E) STATIC TYPE PHASE CONVERTER TO BE INSTALLED ON RACK. CONVERTER TO BE RONK ADD A PHASE, S TYPE, 10HP WITH 115 ENCLOSURE OR APPROVED EQUAL WITH NEMA 3R PROTECTION. CONTACT JIM FERRERO AT RONK ELECTRICAL (800)-721-7665.
- (F) 125A, 1φ, 3 WIRE PANEL SERVICE ENTRANCE RATED. NEMA 4X ENCLOSURE, STAINLESS STEEL (UTILITY SERVICE)
- (G) EQUIPMENT RACK STRUCTURE TO BE 4" x 4" x 3/8" ANGLE WELDED AS REQUIRED TO SUPPORT EQUIPMENT. SEE DETAIL, THIS SHEET.



ELECTRICAL SERVICE DETAIL (1/E1)

NOT TO SCALE

GENERAL NOTES TO DETAIL 1/E1:

1. BOND SERVICE GROUND TO CONDUIT, EACH END. GROUND RODS TO BE COPPER CLAD, U.L. LISTED, 3/4"x 10' WITH MANUFACTURER AND LENGTH DIE STAMPED NEAR TOP OF ROD.
2. COORDINATE EXACT LOCATION OF PANEL IN FIELD. PROVIDE REQUIRED SUPPORT WITH GALVANIZED UNISTRUT SUPPORTS IN CONCRETE BASE. PRIME AND PAINT SUPPORTS WITH RUST INHIBITING PAINT TO MATCH PANEL FINISH.
3. CONTROL PANEL SHALL BE FURNISHED WITH EQUIPMENT AND HAVE AUTO DIALER INTERFACED WITH ALARM OUTPUTS. COORDINATE TELEPHONE SERVICE TO AUTODIALER WITH PHONE UTILITY PER SPECIFICATIONS. CONTRACTOR TO PAY ANY FEES REQUIRED. NEWBERRY COUNTY WILL TRANSFER SERVICE AFTER FINAL ACCEPTANCE.
4. COORDINATE SERVICE WITH LOCAL ELECTRIC UTILITY, FOR 240/120V, 1φ, 3W, 125A SERVICE. PROVIDE ALL REQUIREMENTS AND FEES NECESSARY. UTILITY COMPANY TO PROVIDE AND INSTALL RENTAL LIGHT FIXTURE AND LIGHTNING ARRESTORS. COORDINATE EXACT POLE LOCATION WITH OWNER'S REPRESENTATIVE. NEWBERRY COUNTY WILL TRANSFER SERVICE AFTER FINAL ACCEPTANCE.
5. ALL WIRING SHALL BE BY APPROVED METHODS AND SHALL COMPLY WITH LATEST EDITION OF N.E.C., ALL APPLICABLE LOCAL CODES AND REGULATIONS AND NATIONAL ELECTRICAL SAFETY CODE.
6. CONDUIT TO BE 3/4" MINIMUM, RIGID HEAVY WALL HOT DIP GALVANIZED STEEL. FINAL CONNECTIONS TO VIBRATING EQUIPMENT SHALL BE MADE WITH LIQUID TIGHT FLEXIBLE CONDUIT. CONDUIT SHALL BE MALLEABLE IRON INSULATED TYPE WITH GASKETS AND COVERS.
7. ALL CABLE SHALL BE COPPER WITH THHN/THWN INSULATION, 600V INSULATION. PROVIDE SEPARATE COPPER GREEN GROUND WIRE IN ALL CONDUITS.
8. ALL MOUNTING HARDWARE SHALL BE STAINLESS STEEL.

RECORD DRAWING

DATE: 05/18/15

NO.	REVISION	DATE
0	ISSUED FOR CONSTRUCTION	10/30/14

BURDETTE ENGINEERING, INC.

SHEET TITLE: ELECTRICAL LEGEND AND PLAN

PROJECT TITLE: SOIL GAS REMEDIAL DESIGN NEWBERRY COUNTY LANDFILL

CLIENT: NEWBERRY COUNTY PUBLIC WORKS, PO BOX 156, NEWBERRY, SC 29108

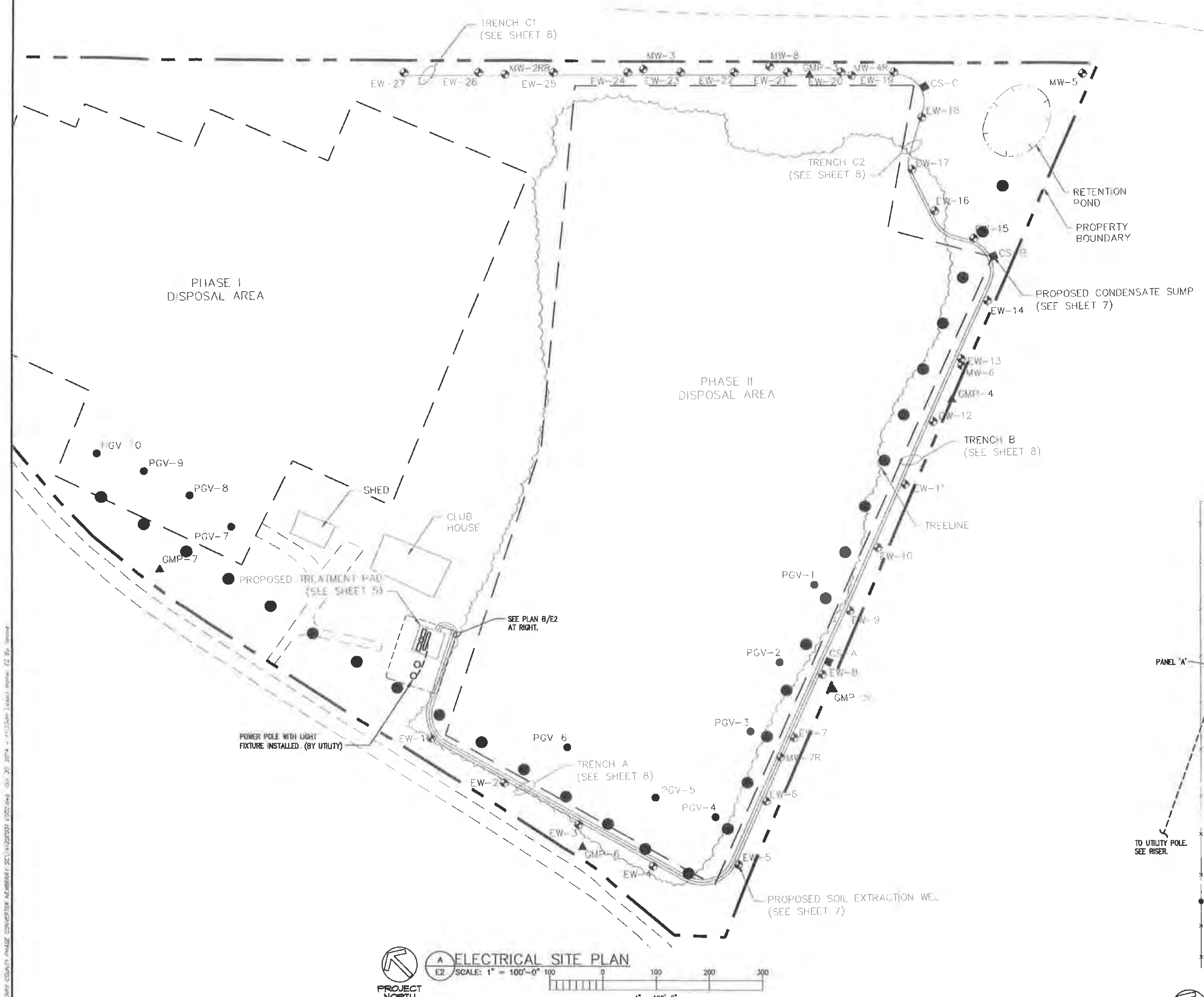
SCS ENGINEERS
2520 WHITEHALL PARK DRIVE, SUITE 450
CHARLOTTE, NORTH CAROLINA 28273
PHONE: (704) 504-3107 FAX: (704) 504-3174

PROJ. NO.: 02212202.02 — DWN. BY: TMP — QA RVW BY: DJB — DSN. BY: RAB — CHK. BY: DJB — APP. BY: DJB

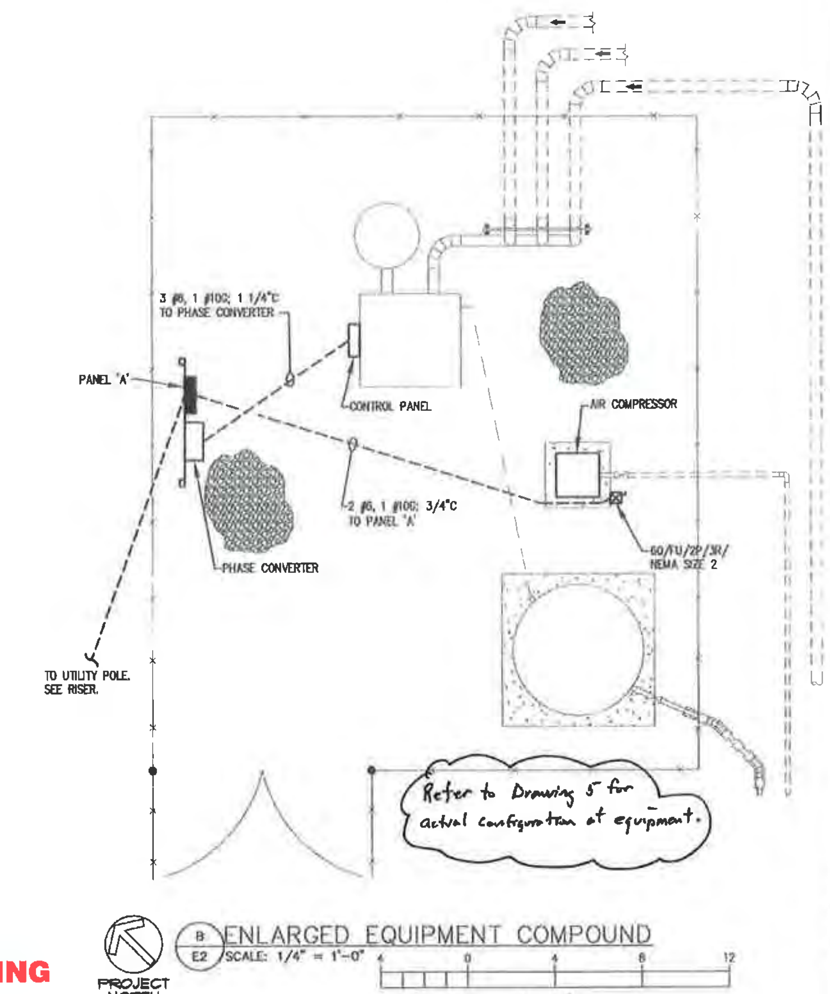
DATE: OCTOBER 30, 2014

SCALE: AS SHOWN

DRAWING NO. E1 of 2



A ELECTRICAL SITE PLAN
E2 SCALE: 1" = 100'-0"



B ENLARGED EQUIPMENT COMPOUND
E2 SCALE: 1/4" = 1'-0"

RECORD DRAWING
DATE: 05/18/15

NO.	REVISION	DATE
0	ISSUED FOR CONSTRUCTION	10/30/14

BURDETTE ENGINEERING, INC

SHEET TITLE
ELECTRICAL POWER PLAN

PROJECT TITLE
SOIL GAS REMEDIAL DESIGN
NEWBERRY COUNTY LANDFILL

CLIENT
NEWBERRY COUNTY
PUBLIC WORKS
PO BOX 156
NEWBERRY, SC 29108

SCS ENGINEERS
2520 WHITEHALL PARK DRIVE, SUITE 450
CHARLOTTE, NORTH CAROLINA 28273
PHONE: (704) 504-3107 FAX: (704) 504-3174

PROJ. NO. 02212302.02	DWN. BY: TMP	QA RVW BY: DJB
DSN. BY: RAB	CHK. BY: DJB	APP. BY: DJB

DATE: OCTOBER 30, 2014
SCALE: AS SHOWN
DRAWING NO.
E2 of 2

APPENDIX B

Photo 1. Drill rig

Photo 2. Drill auger

Photo 3. Installing sand pack in well

Photo 4. HDPE pipe fusion welding machine

Photo 5. Header trench and pipe

Photo 6. Header pipe and lateral pipe to well

Photo 7. Header pipe and lateral pipes to well

Photo 8. Laser survey control for pipe

Photo 9. Dual-contained forcemain pipe

Photo 10. Pressure gauge for pressure test of header pipe. Wellhead and hose on well.

Photo 11. Installation of forms and gravel pad

Photo 12. Forms and wire mesh for storage tank pad

Photo 13. Finished concrete pads for tank and air compressor.

Photo 14. Workers setting pole and electrical panel

Photo 15. Blower enclosure, vapor canister, and storage tank.

Photo 17. Inside blower enclosure

Photo 18. Force main from knock out pot to storage tank.

Dot Energy Solutions, Inc.

Landfill Gas Extraction Well - Boring and Installation Log

Soil Gas Extraction Project

Project Name: Newberry County Landfill Date: Monday, March 30, 2015

Project Number:

DRILLING

EW-1	Well Number or Name
30	Linear Feet of Drilling
27	Linear Feet of Completion
0	Linear Feet of Abandonment

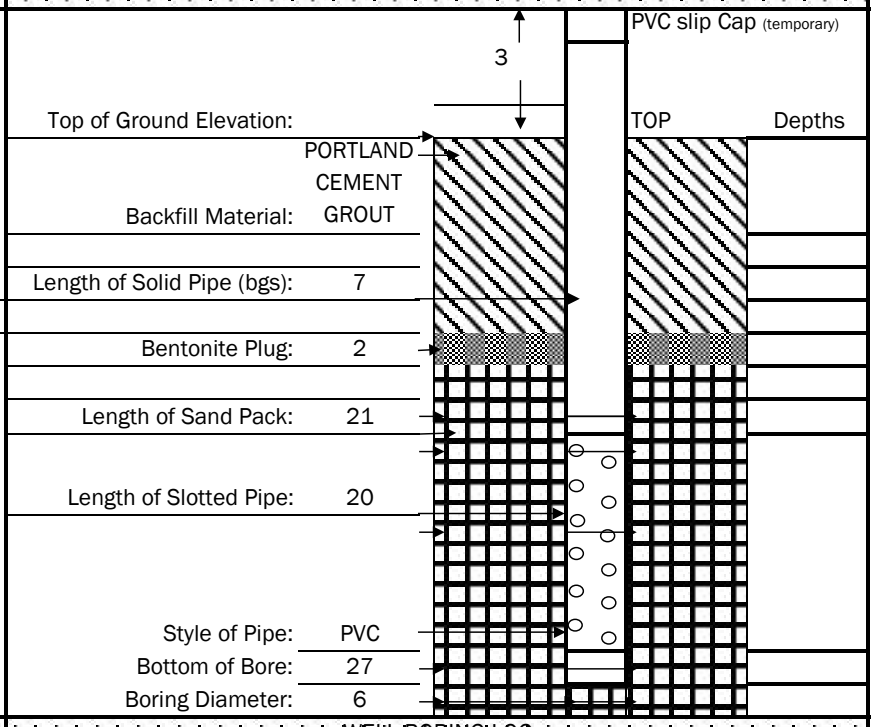
Time In: _____ Time Out: _____

Weather Conditions: SUNNY

Site Conditions WET

Comments:

WELL COMPLETION LOG



MONITORING

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19:00				

Notes:

WELL BORING LOG

Depth (Feet)	Composition	Degree of Decomp	Estimated Degree of Moisture	Water Level (Feet BGS)	Temp (°F)
0-10					
10-20					
20-30					
30-40					
40-50					
50-60					
60-70					
70-80					
80-90					
90-100					
100-110					
110-120					
120-130					
130-140					
140-150					
Total Drilled Depth:					

Owner Representative Date

Jon Dotterer 26-Apr

Contractor Representative Date

CQA Technician Date

Dot Energy Solutions, Inc.

Landfill Gas Extraction Well - Boring and Installation Log

Soil Gas Extraction Project

Project Name: Newberry County Landfill Date: Monday, March 30, 2015

Project Number:

DRILLING

EW-2	Well Number or Name
30	Linear Feet of Drilling
27	Linear Feet of Completion
0	Linear Feet of Abandonment

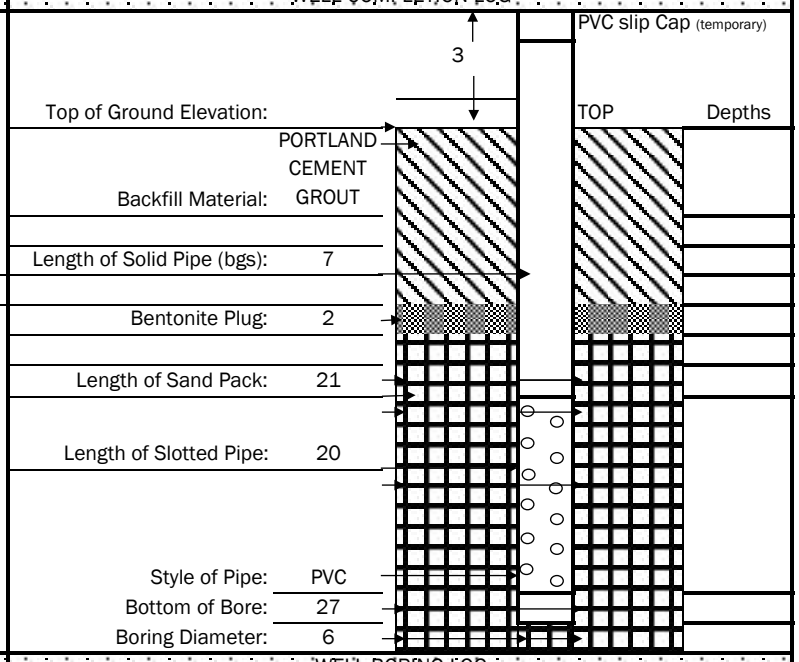
Time In: _____ Time Out: _____

Weather Conditions: SUNNY

Site Conditions WET

Comments:

WELL COMPLETION LOG



MONITORING

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19:00				

Notes:

WELL BORING LOG

Depth (Feet)	Composition	Degree of Decomp	Estimated Degree of Moisture	Water Level (Feet BGS)	Temp (°F)
0-10					
10-20					
20-30					
30-40					
40-50					
50-60					
60-70					
70-80					
80-90					
90-100					
100-110					
110-120					
120-130					
130-140					
140-150					
Total Drilled Depth:					

Jon Dotterer 26-Apr

Owner Representative Date

Contractor Representative Date

CQA Technician Date

Dot Energy Solutions, Inc.

Landfill Gas Extraction Well - Boring and Installation Log

Soil Gas Extraction Project

Project Name: Newberry County Landfill Date: Monday, March 30, 2015

Project Number:

DRILLING

EW-3/3A	Well Number or Name
23	Linear Feet of Drilling
22	Linear Feet of Completion
10	Linear Feet of Abandonment

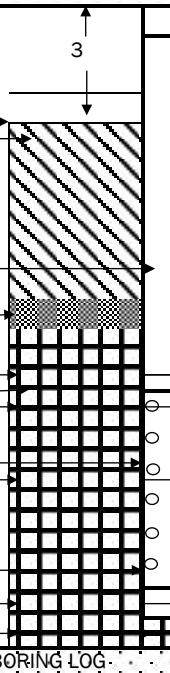
Time In: _____ Time Out: _____

Weather Conditions: SUNNY

Site Conditions: WET

Comments:

WELL COMPLETION LOG



MONITORING

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Notes:

WELL BORING LOG

Depth (Feet)	Composition	Degree of Decomp	Estimated Degree of Moisture	Water Level (Feet BGS)	Temp (°F)
0-10					
10-20					
20-30					
30-40					
40-50					
50-60					
60-70					
70-80					
80-90					
90-100					
100-110					
110-120					
120-130					
130-140					
140-150					
Total Drilled Depth:					

Jon Dotterer 26-Apr

Owner Representative Date

Contractor Representative Date

CQA Technician Date

Dot Energy Solutions, Inc.

Landfill Gas Extraction Well - Boring and Installation Log

Soil Gas Extraction Project

Project Name: Newberry County Landfill Date: Monday, March 30, 2015

Project Number:

DRILLING

EW-4	Well Number or Name
41	Linear Feet of Drilling
40	Linear Feet of Completion
0	Linear Feet of Abandonment

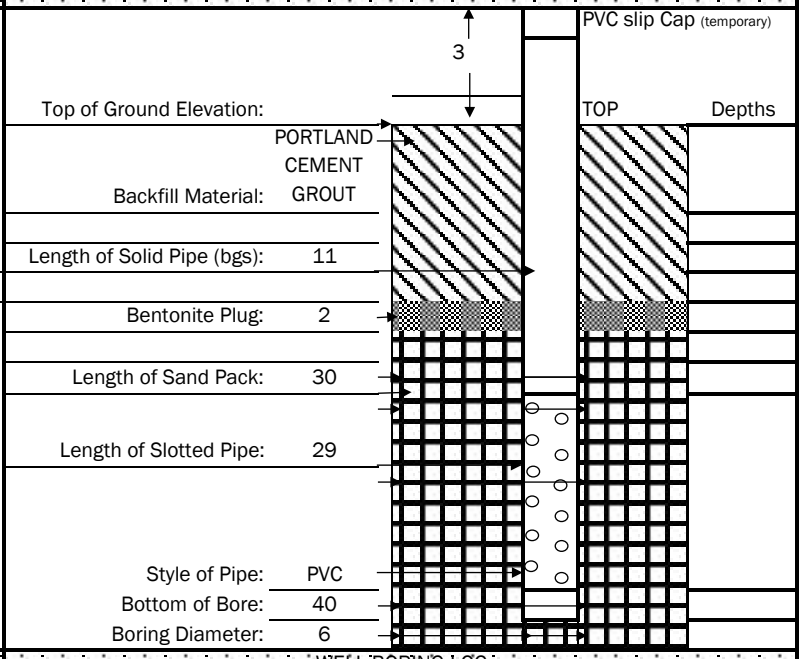
Time In: Time Out:

Weather Conditions: SUNNY

Site Conditions WET

Comments:

WELL COMPLETION LOG



MONITORING

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Notes:

WELL BORING LOG

Depth (Feet)	Composition	Degree of Decomp	Estimated Degree of Moisture	Water Level (Feet BGS)	Temp (°F)
0-10					
10-20					
20-30					
30-40					
40-50					
50-60					
60-70					
70-80					
80-90					
90-100					
100-110					
110-120					
120-130					
130-140					
140-150					
Total Drilled Depth:					

Owner Representative Date

Jon Dotterer 26-Apr

Contractor Representative Date

CQA Technician Date

Dot Energy Solutions, Inc.

Landfill Gas Extraction Well - Boring and Installation Log

Soil Gas Extraction Project

Project Name: Newberry County Landfill Date: Monday, March 30, 2015

Project Number:

DRILLING

EW-5	Well Number or Name
42	Linear Feet of Drilling
41	Linear Feet of Completion
0	Linear Feet of Abandonment

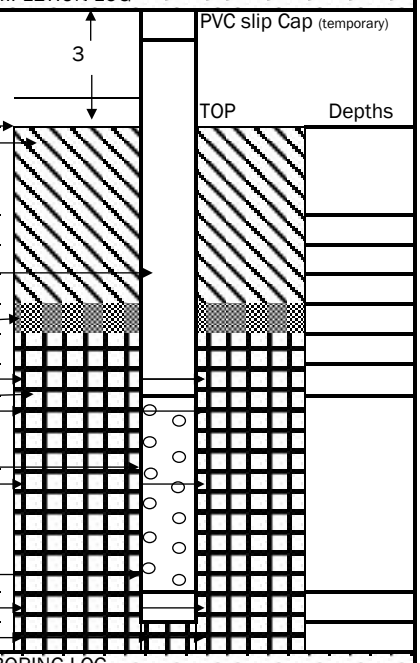
Time In: _____ Time Out: _____

Weather Conditions: SUNNY

Site Conditions WET

Comments:

WELL COMPLETION LOG



Top of Ground Elevation:	
Backfill Material:	PORTLAND CEMENT GROUT
Length of Solid Pipe (bgs):	11
Bentonite Plug:	2
Length of Sand Pack:	30
Length of Slotted Pipe:	29
Style of Pipe:	PVC
Bottom of Bore:	41
Boring Diameter:	6

MONITORING

Instrument Calibration Date:

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19:00				

Notes:

WELL BORING LOG

Depth (Feet)	Composition	Degree of Decomp	Estimated Degree of Moisture	Water Level (Feet BGS)	Temp (°F)
0-10					
10-20					
20-30					
30-40					
40-50					
50-60					
60-70					
70-80					
80-90					
90-100					
100-110					
110-120					
120-130					
130-140					
140-150					
Total Drilled Depth:					

Jon Dotterer 26-Apr

Owner Representative Date

Contractor Representative Date

CQA Technician Date

Dot Energy Solutions, Inc.

Landfill Gas Extraction Well - Boring and Installation Log

Soil Gas Extraction Project

Project Name: Newberry County Landfill Date: Monday, March 30, 2015

Project Number:

DRILLING

EW-6	Well Number or Name
35	Linear Feet of Drilling
34	Linear Feet of Completion
0	Linear Feet of Abandonment

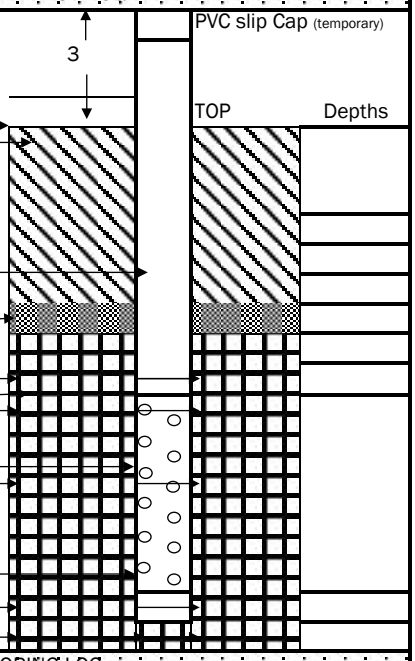
Time In: _____ Time Out: _____

Weather Conditions: SUNNY

Site Conditions WET

Comments:

WELL COMPLETION LOG



MONITORING

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Notes:

WELL BORING LOG

Depth (Feet)	Composition	Degree of Decomp	Estimated Degree of Moisture	Water Level (Feet BGS)	Temp (°F)
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10-20					
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70-80					
80-90					
90-100					
100-110					
110-120					
120-130					
130-140					
140-150					
Total Drilled Depth:					

Jon Dotterer 26-Apr

Owner Representative Date

Contractor Representative Date

CQA Technician Date

Dot Energy Solutions, Inc.

Landfill Gas Extraction Well - Boring and Installation Log

Soil Gas Extraction Project

Project Name: Newberry County Landfill Date: Monday, March 30, 2015

Project Number:

DRILLING

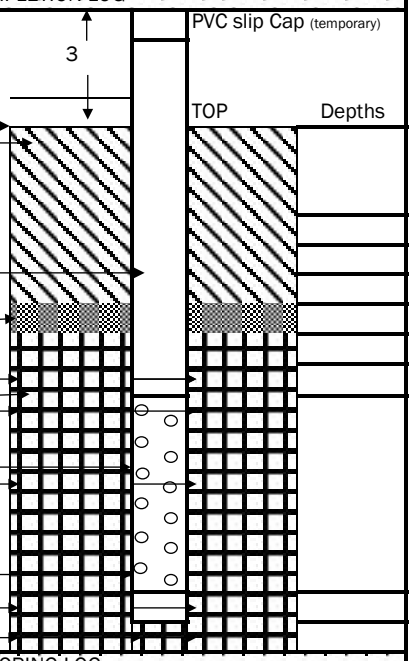
EW-7/7A	Well Number or Name
35	Linear Feet of Drilling
34	Linear Feet of Completion
15	Linear Feet of Abandonment

Time In: _____ Time Out: _____

Weather Conditions: SUNNY

Site Conditions WET

WELL COMPLETION LOG



Top of Ground Elevation:	
Backfill Material:	PORTLAND CEMENT GROUT
Length of Solid Pipe (bgs):	12
Bentonite Plug:	2
Length of Sand Pack:	23
Length of Slotted Pipe:	22
Style of Pipe:	PVC
Bottom of Bore:	34
Boring Diameter:	6

MONITORING

Instrument Calibration Date:

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Notes:

WELL BORING LOG

Depth (Feet)	Composition	Degree of Decomp	Estimated Degree of Moisture	Water Level (Feet BGS)	Temp (°F)
0-10					
10-20					
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30-40					
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60-70					
70-80					
80-90					
90-100					
100-110					
110-120					
120-130					
130-140					
140-150					
Total Drilled Depth:					

Jon Dotterer 26-Apr

Owner Representative Date

Contractor Representative Date

CQA Technician Date

Dot Energy Solutions, Inc.

Landfill Gas Extraction Well - Boring and Installation Log

Soil Gas Extraction Project

Project Name: Newberry County Landfill Date: Monday, March 30, 2015

Project Number:

DRILLING

EW-8	Well Number or Name
35	Linear Feet of Drilling
34	Linear Feet of Completion
0	Linear Feet of Abandonment

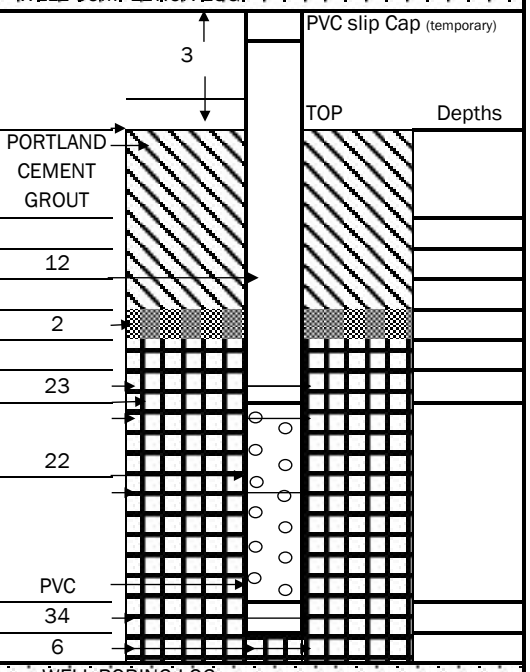
Time In: _____ Time Out: _____

Weather Conditions: SUNNY

Site Conditions WET

Comments:

WELL COMPLETION LOG



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Notes:

WELL BORING LOG

Depth (Feet)	Composition	Degree of Decomp	Estimated Degree of Moisture	Water Level (Feet BGS)	Temp (°F)
0-10					
10-20					
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50-60					
60-70					
70-80					
80-90					
90-100					
100-110					
110-120					
120-130					
130-140					
140-150					
Total Drilled Depth:					

Jon Dotterer 26-Apr

Owner Representative Date

Contractor Representative Date

CQA Technician Date

Dot Energy Solutions, Inc.

Landfill Gas Extraction Well - Boring and Installation Log

Soil Gas Extraction Project

Project Name: Newberry County Landfill Date: Monday, March 30, 2015

Project Number:

DRILLING

EW-9	Well Number or Name
36	Linear Feet of Drilling
35	Linear Feet of Completion
0	Linear Feet of Abandonment

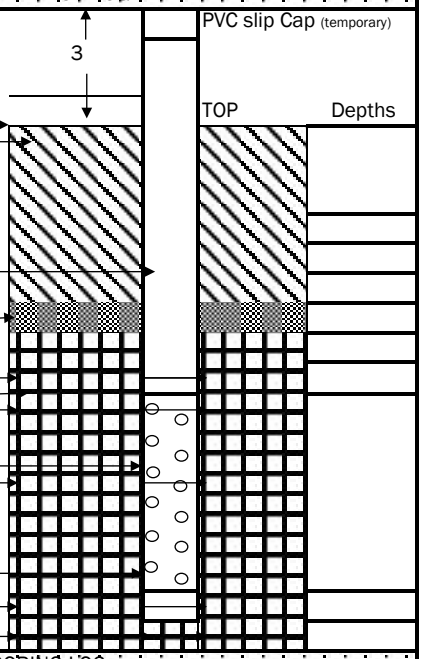
Time In: _____ Time Out: _____

Weather Conditions: SUNNY

Site Conditions WET

Comments:

WELL COMPLETION LOG



MONITORING

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Notes:

WELL BORING LOG

Depth (Feet)	Composition	Degree of Decomp	Estimated Degree of Moisture	Water Level (Feet BGS)	Temp (°F)
0-10					
10-20					
20-30					
30-40					
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60-70					
70-80					
80-90					
90-100					
100-110					
110-120					
120-130					
130-140					
140-150					
Total Drilled Depth:					

Jon Dotterer 26-Apr

Owner Representative Date

Contractor Representative Date

CQA Technician Date

Dot Energy Solutions, Inc.

Landfill Gas Extraction Well - Boring and Installation Log

Soil Gas Extraction Project

Project Name: Newberry County Landfill Date: Monday, March 30, 2015

Project Number:

DRILLING

EW-10	Well Number or Name
34	Linear Feet of Drilling
33	Linear Feet of Completion
0	Linear Feet of Abandonment

Time In: _____ Time Out: _____

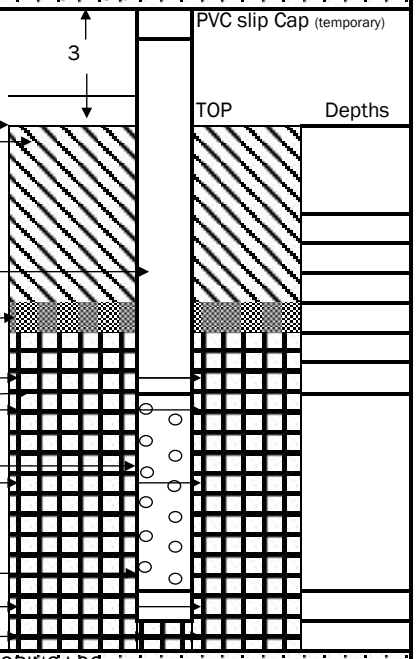
Weather Conditions:

Site Conditions

Comments:

WELL COMPLETION LOG

Top of Ground Elevation:	3
Backfill Material:	PORTLAND CEMENT GROUT
Length of Solid Pipe (bgs):	11
Bentonite Plug:	2
Length of Sand Pack:	23
Length of Slotted Pipe:	22
Style of Pipe:	PVC
Bottom of Bore:	33
Boring Diameter:	6



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19:00				

Notes:

WELL BORING LOG

Depth (Feet)	Composition	Degree of Decomp	Estimated Degree of Moisture	Water Level (Feet BGS)	Temp (°F)
0-10					
10-20					
20-30					
30-40					
40-50					
50-60					
60-70					
70-80					
80-90					
90-100					
100-110					
110-120					
120-130					
130-140					
140-150					
Total Drilled Depth:					

Owner Representative Date

Jon Dotterer 26-Apr

Contractor Representative Date

CQA Technician Date

Dot Energy Solutions, Inc.

Landfill Gas Extraction Well - Boring and Installation Log

Soil Gas Extraction Project

Project Name: Newberry County Landfill Date: Sunday, March 29, 2015

Project Number:

DRILLING

EW-11	Well Number or Name
31.5	Linear Feet of Drilling
31	Linear Feet of Completion
0	Linear Feet of Abandonment

Time In: _____ Time Out: _____

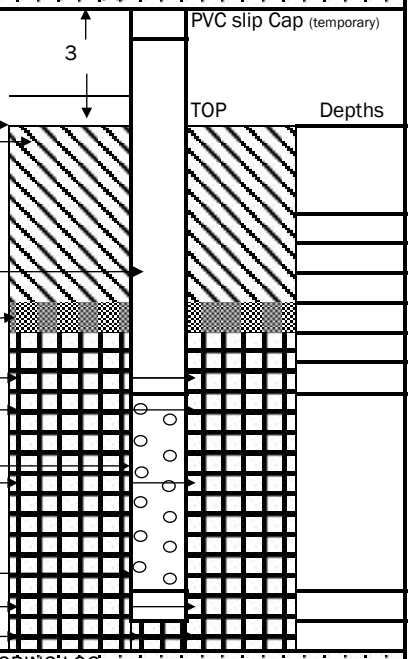
Weather Conditions:

Site Conditions

Comments:

WELL COMPLETION LOG

Top of Ground Elevation:	
Backfill Material:	PORTLAND CEMENT GROUT
Length of Solid Pipe (bgs):	11
Bentonite Plug:	2
Length of Sand Pack:	21
Length of Slotted Pipe:	20
Style of Pipe:	PVC
Bottom of Bore:	
Boring Diameter:	6



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Notes:

WELL BORING LOG

Depth (Feet)	Composition	Degree of Decomp	Estimated Degree of Moisture	Water Level (Feet BGS)	Temp (°F)
0-10					
10-20					
20-30					
30-40					
40-50					
50-60					
60-70					
70-80					
80-90					
90-100					
100-110					
110-120					
120-130					
130-140					
140-150					
Total Drilled Depth:					

Jon Dotterer 26-Apr

Owner Representative Date

Contractor Representative Date

CQA Technician Date

Dot Energy Solutions, Inc.

Landfill Gas Extraction Well - Boring and Installation Log

Soil Gas Extraction Project

Project Name: Newberry County Landfill Date: Sunday, March 29, 2015

Project Number:

DRILLING

EW-12	Well Number or Name
31	Linear Feet of Drilling
30	Linear Feet of Completion
0	Linear Feet of Abandonment

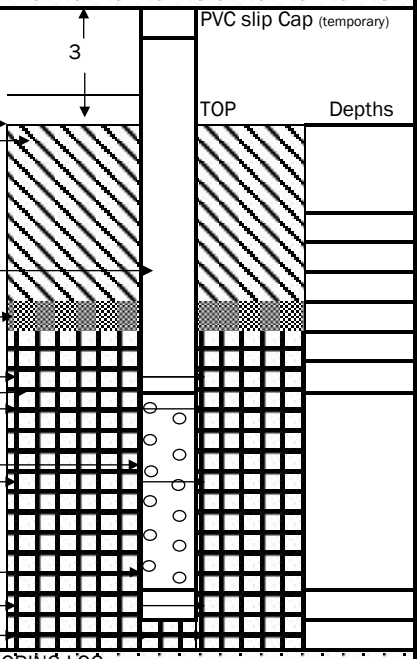
Time In: _____ Time Out: _____

Weather Conditions: OVERCAST

Site Conditions: WET

Comments:

WELL COMPLETION LOG



MONITORING

Instrument Calibration Date:

Time	O_2	H_2S	LEL/CO	Date
7:00				
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16:00				
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19:00				

Notes:

WELL BORING LOG

Depth (Feet)	Composition	Degree of Decomp	Estimated Degree of Moisture	Water Level (Feet BGS)	Temp (°F)
0-10					
10-20					
20-30					
30-40					
40-50					
50-60					
60-70					
70-80					
80-90					
90-100					
100-110					
110-120					
120-130					
130-140					
140-150					
Total Drilled Depth:					

Jon Dotterer 26-Apr

Owner Representative Date

Contractor Representative Date

CQA Technician Date

Dot Energy Solutions, Inc.

Landfill Gas Extraction Well - Boring and Installation Log

Soil Gas Extraction Project

Project Name: Newberry County Landfill Date: Sunday, March 29, 2015

Project Number:

DRILLING

EW-13	Well Number or Name
26	Linear Feet of Drilling
25	Linear Feet of Completion
0	Linear Feet of Abandonment

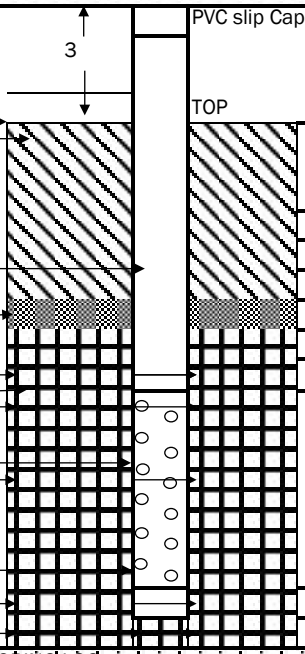
Time In: _____ Time Out: _____

Weather Conditions:

Site Conditions

Comments:

WELL COMPLETION LOG



Top of Ground Elevation:	
Backfill Material:	PORTLAND CEMENT GROUT
Length of Solid Pipe (bgs):	8
Bentonite Plug:	2
Length of Sand Pack:	16
Length of Slotted Pipe:	15
Style of Pipe:	PVC
Bottom of Bore:	26
Boring Diameter:	6

MONITORING

Instrument Calibration Date:

Time	O_2	H_2S	LEL/CO	Date
7:00				
8:00				
9:00				
10:00				
11:00				
12:00				
13:00				
14:00				
15:00				
16:00				
17:00				
18:00				
19:00				

Notes:

WELL BORING LOG

Depth (Feet)	Composition	Degree of Decomp	Estimated Degree of Moisture	Water Level (Feet BGS)	Temp (°F)
0-10					
10-20					
20-30					
30-40					
40-50					
50-60					
60-70					
70-80					
80-90					
90-100					
100-110					
110-120					
120-130					
130-140					
140-150					
Total Drilled Depth:					

Owner Representative Date

Jon Dotterer 26-Apr

Contractor Representative Date

CQA Technician Date

Dot Energy Solutions, Inc.

Landfill Gas Extraction Well - Boring and Installation Log

Soil Gas Extraction Project

Project Name: Newberry County Landfill Date: Sunday, March 29, 2015

Project Number:

DRILLING

EW-14	Well Number or Name
31	Linear Feet of Drilling
30	Linear Feet of Completion
0	Linear Feet of Abandonment

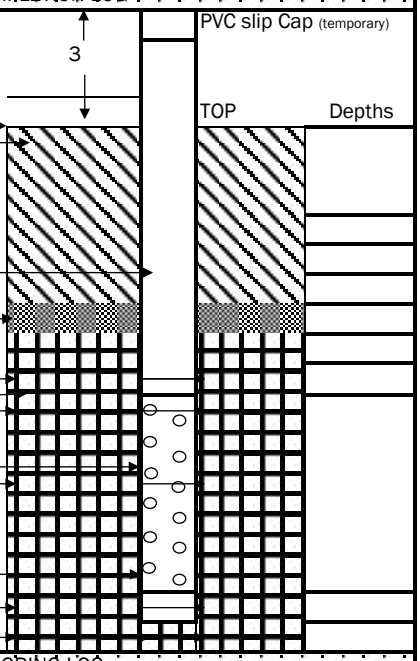
Time In: _____ Time Out: _____

Weather Conditions: OVERCAST

Site Conditions: WET

Comments:

WELL COMPLETION LOG



MONITORING

Instrument Calibration Date:

Time	O_2	H_2S	LEL/CO	Date
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14:00				
15:00				
16:00				
17:00				
18:00				
19:00				

Notes:

WELL BORING LOG

Depth (Feet)	Composition	Degree of Decomp	Estimated Degree of Moisture	Water Level (Feet BGS)	Temp (°F)
0-10					
10-20					
20-30					
30-40					
40-50					
50-60					
60-70					
70-80					
80-90					
90-100					
100-110					
110-120					
120-130					
130-140					
140-150					
Total Drilled Depth:					

Owner Representative Date

Jon Dotterer 26-Apr

Contractor Representative Date

CQA Technician Date

Dot Energy Solutions, Inc.

Landfill Gas Extraction Well - Boring and Installation Log

Soil Gas Extraction Project

Project Name: Newberry County Landfill Date: Sunday, March 29, 2015

Project Number:

DRILLING

EW-15 Well Number or Name

Linear Feet of Drilling

Linear Feet of Completion

25 Linear Feet of Abandonment

Time In: Time Out:

Weather Conditions:

Site Conditions

Comments:

WELL COMPLETION LOG

DELETED

Top of Ground Elevation:

Backfill Material: PORTLAND CEMENT GROUT

Length of Solid Pipe (bgs):

Bentonite Plug:

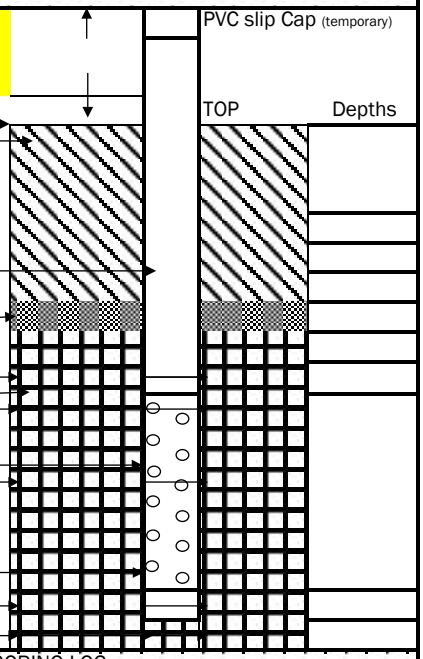
Length of Sand Pack:

Length of Slotted Pipe:

Style of Pipe:

Bottom of Bore:

Boring Diameter:



MONITORING

Instrument Calibration Date:

Time	O_2	H_2S	LEL/CO	Date
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16:00				
17:00				
18:00				
19:00				

Notes:

WELL BORING LOG

Depth (Feet)	Composition	Degree of Decomp	Estimated Degree of Moisture	Water Level (Feet BGS)	Temp (°F)
0-10					
10-20					
20-30					
30-40					
40-50					
50-60					
60-70					
70-80					
80-90					
90-100					
100-110					
110-120					
120-130					
130-140					
140-150					
Total Drilled Depth:					

Owner Representative Date

Jon Dotterer 26-Apr

Contractor Representative Date

CQA Technician Date

Dot Energy Solutions, Inc.

Landfill Gas Extraction Well - Boring and Installation Log

Soil Gas Extraction Project

Project Name: Newberry County Landfill Date: Sunday, March 29, 2015

Project Number:

DRILLING

EW-16	Well Number or Name
27	Linear Feet of Drilling
26	Linear Feet of Completion
0	Linear Feet of Abandonment

Time In: _____ Time Out: _____

Weather Conditions:

Site Conditions

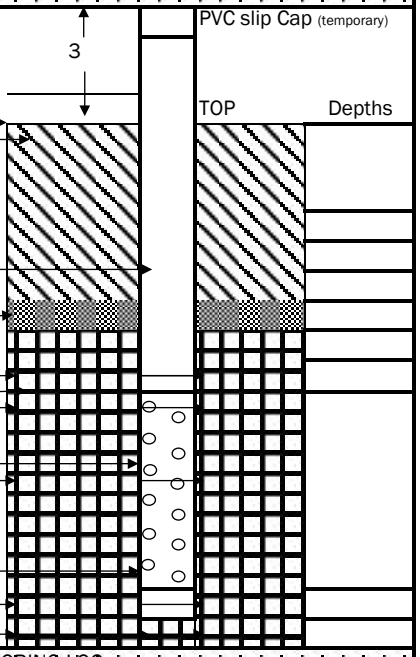
Comments:

WELL COMPLETION LOG

Top of Ground Elevation:	3
Backfill Material:	PORTLAND CEMENT GROUT
Length of Solid Pipe (bgs):	10
Bentonite Plug:	2
Length of Sand Pack:	16
Length of Slotted Pipe:	15
Style of Pipe:	PVC
Bottom of Bore:	27
Boring Diameter:	6

PVC slip Cap (temporary)

TOP Depths



MONITORING

Instrument Calibration Date:

Time	O_2	H_2S	LEL/CO	Date
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14:00				
15:00				
16:00				
17:00				
18:00				
19:00				

Notes:

WELL BORING LOG

Depth (Feet)	Composition	Degree of Decomp	Estimated Degree of Moisture	Water Level (Feet BGS)	Temp (°F)
0-10					
10-20					
20-30					
30-40					
40-50					
50-60					
60-70					
70-80					
80-90					
90-100					
100-110					
110-120					
120-130					
130-140					
140-150					
Total Drilled Depth:					

Jon Dotterer 26-Apr

Owner Representative Date

Contractor Representative Date

CQA Technician Date

Dot Energy Solutions, Inc.

Landfill Gas Extraction Well - Boring and Installation Log

Soil Gas Extraction Project

Project Name: Newberry County Landfill Date: Sunday, March 29, 2015

Project Number:

DRILLING

EW-17	Well Number or Name
26	Linear Feet of Drilling
25	Linear Feet of Completion
0	Linear Feet of Abandonment

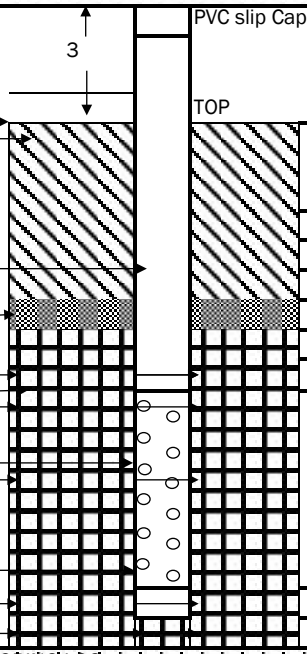
Time In: _____ Time Out: _____

Weather Conditions: OVERCAST

Site Conditions: WET

Comments:

WELL COMPLETION LOG



Top of Ground Elevation:	
Backfill Material:	PORTLAND CEMENT GROUT
Length of Solid Pipe (bgs):	7
Bentonite Plug:	2
Length of Sand Pack:	15
Length of Slotted Pipe:	14
Style of Pipe:	PVC
Bottom of Bore:	26
Boring Diameter:	6

MONITORING

Instrument Calibration Date:

Time	O_2	H_2S	LEL/CO	Date
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14:00				
15:00				
16:00				
17:00				
18:00				
19:00				

Notes:

WELL BORING LOG

Depth (Feet)	Composition	Degree of Decomp	Estimated Degree of Moisture	Water Level (Feet BGS)	Temp (°F)
0-10					
10-20					
20-30					
30-40					
40-50					
50-60					
60-70					
70-80					
80-90					
90-100					
100-110					
110-120					
120-130					
130-140					
140-150					
Total Drilled Depth:					

Jon Dotterer 26-Apr

Owner Representative Date

Contractor Representative Date

CQA Technician Date

Dot Energy Solutions, Inc.

Landfill Gas Extraction Well - Boring and Installation Log

Project Name: Soil Gas Extraction Project
Newberry County Landfill

Date: Sunday, March 29, 2015

Project Number:

DRILLING

EW-18	Well Number or Name
18	Linear Feet of Drilling
17.5	Linear Feet of Completion
0	Linear Feet of Abandonment

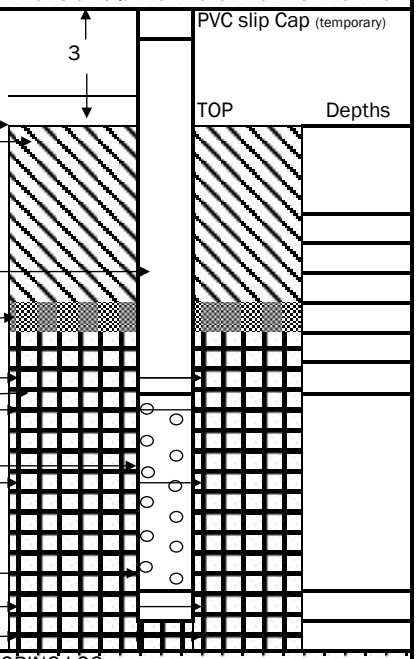
Time In: Time Out:

Weather Conditions: OVERCAST

Site Conditions: WET

Comments:

WELL COMPLETION LOG



MONITORING

Instrument Calibration Date:

Time	O_2	H_2S	LEL/CO	Date
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19:00				

Notes:

WELL BORING LOG

Depth (Feet)	Composition	Degree of Decomp	Estimated Degree of Moisture	Water Level (Feet BGS)	Temp (°F)
0-10					
10-20					
20-30					
30-40					
40-50					
50-60					
60-70					
70-80					
80-90					
90-100					
100-110					
110-120					
120-130					
130-140					
140-150					
Total Drilled Depth:					

Owner Representative Date

Jon Dotterer 26-Apr

Contractor Representative Date

CQA Technician Date

Dot Energy Solutions, Inc.

Landfill Gas Extraction Well - Boring and Installation Log

Soil Gas Extraction Project

Project Name: Newberry County Landfill Date: Sunday, March 29, 2015

Project Number:

DRILLING

EW-19	Well Number or Name
26	Linear Feet of Drilling
25	Linear Feet of Completion
0	Linear Feet of Abandonment

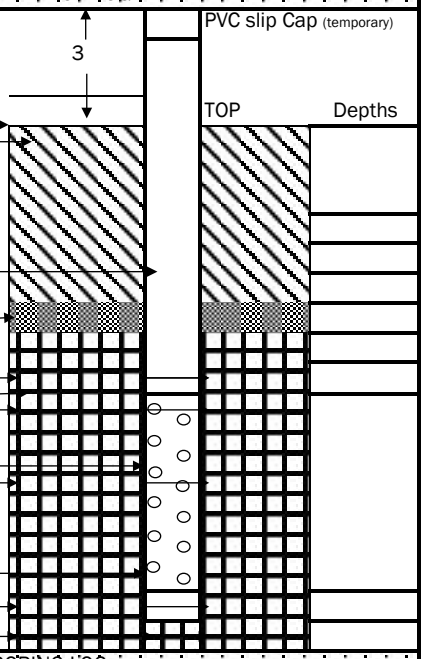
Time In: _____ Time Out: _____

Weather Conditions: OVERCAST

Site Conditions: WET

Comments:

WELL COMPLETION LOG



Top of Ground Elevation:	
Backfill Material:	PORTLAND CEMENT GROUT
Length of Solid Pipe (bgs):	11
Bentonite Plug:	2
Length of Sand Pack:	15
Length of Slotted Pipe:	14
Style of Pipe:	PVC
Bottom of Bore:	25
Boring Diameter:	6

MONITORING

Instrument Calibration Date:

Time	O_2	H_2S	LEL/CO	Date
7:00				
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11:00				
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14:00				
15:00				
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17:00				
18:00				
19:00				

Notes:

WELL BORING LOG

Depth (Feet)	Composition	Degree of Decomp	Estimated Degree of Moisture	Water Level (Feet BGS)	Temp (°F)
0-10					
10-20					
20-30					
30-40					
40-50					
50-60					
60-70					
70-80					
80-90					
90-100					
100-110					
110-120					
120-130					
130-140					
140-150					
Total Drilled Depth:					

Owner Representative Date

Jon Dotterer 26-Apr

Contractor Representative Date

CQA Technician Date

Dot Energy Solutions, Inc.

Landfill Gas Extraction Well - Boring and Installation Log

Soil Gas Extraction Project

Project Name: Newberry County Landfill Date: Sunday, March 29, 2015

Project Number:

DRILLING

EW-20	Well Number or Name
26	Linear Feet of Drilling
25	Linear Feet of Completion
0	Linear Feet of Abandonment

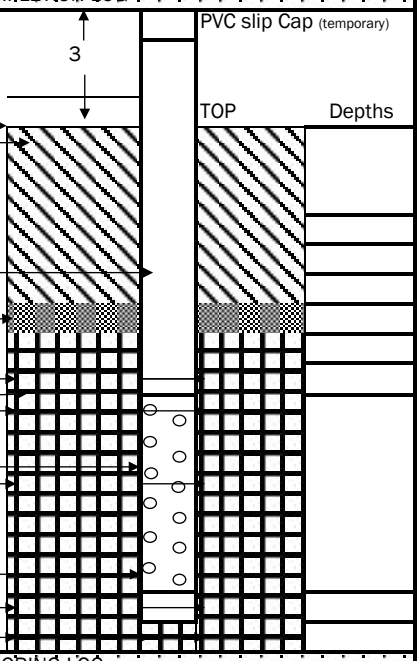
Time In: _____ Time Out: _____

Weather Conditions: OVERCAST

Site Conditions: WET

Comments:

WELL COMPLETION LOG



MONITORING

Instrument Calibration Date:

Time	O_2	H_2S	LEL/CO	Date
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12:00				
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14:00				
15:00				
16:00				
17:00				
18:00				
19:00				

Notes:

WELL BORING LOG

Depth (Feet)	Composition	Degree of Decomp	Estimated Degree of Moisture	Water Level (Feet BGS)	Temp (°F)
0-10					
10-20					
20-30					
30-40					
40-50					
50-60					
60-70					
70-80					
80-90					
90-100					
100-110					
110-120					
120-130					
130-140					
140-150					
Total Drilled Depth:					

Jon Dotterer 26-Apr

Owner Representative Date

Contractor Representative Date

CQA Technician Date

Dot Energy Solutions, Inc.

Landfill Gas Extraction Well - Boring and Installation Log

Soil Gas Extraction Project

Project Name: Newberry County Landfill Date: Sunday, March 29, 2015

Project Number:

DRILLING

EW-21	Well Number or Name
23	Linear Feet of Drilling
22	Linear Feet of Completion
0	Linear Feet of Abandonment

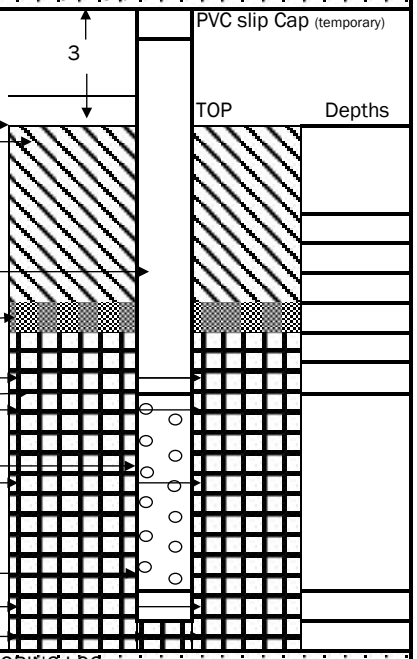
Time In: _____ Time Out: _____

Weather Conditions: OVERCAST

Site Conditions: WET

Comments:

WELL COMPLETION LOG



MONITORING

Instrument Calibration Date:

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14:00				
15:00				
16:00				
17:00				
18:00				
19:00				

Notes:

WELL BORING LOG

Depth (Feet)	Composition	Degree of Decomp	Estimated Degree of Moisture	Water Level (Feet BGS)	Temp (°F)
0-10					
10-20					
20-30					
30-40					
40-50					
50-60					
60-70					
70-80					
80-90					
90-100					
100-110					
110-120					
120-130					
130-140					
140-150					
Total Drilled Depth:					

Owner Representative Date

Jon Dotterer 26-Apr

Contractor Representative Date

CQA Technician Date

Dot Energy Solutions, Inc.

Landfill Gas Extraction Well - Boring and Installation Log

Project Name: Soil Gas Extraction Project
Newberry County Landfill

Date: Sunday, March 29, 2015

Project Number:

DRILLING

EW-22	Well Number or Name
23	Linear Feet of Drilling
22	Linear Feet of Completion
0	Linear Feet of Abandonment

Time In: Time Out:

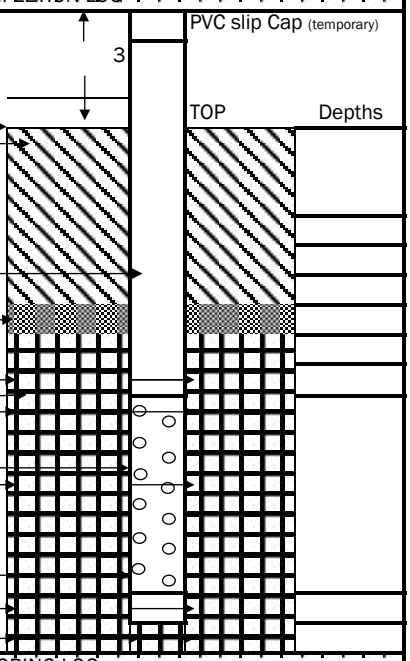
Weather Conditions: OVERCAST

Site Conditions WET

Comments:

WELL COMPLETION LOG

Top of Ground Elevation:	3
Backfill Material:	PORTLAND CEMENT GROUT
Length of Solid Pipe (bgs):	7
Bentonite Plug:	2
Length of Sand Pack:	16
Length of Slotted Pipe:	15
Style of Pipe:	PVC
Bottom of Bore:	23
Boring Diameter:	6



MONITORING

Instrument Calibration Date:

Time	O_2	H_2S	LEL/CO	Date
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17:00				
18:00				
19:00				

Notes:

WELL BORING LOG

Depth (Feet)	Composition	Degree of Decomp	Estimated Degree of Moisture	Water Level (Feet BGS)	Temp (°F)
0-10					
10-20					
20-30					
30-40					
40-50					
50-60					
60-70					
70-80					
80-90					
90-100					
100-110					
110-120					
120-130					
130-140					
140-150					
Total Drilled Depth:					

Owner Representative Date

Jon Dotterer 26-Apr

Contractor Representative Date

CQA Technician Date

Dot Energy Solutions, Inc.

Landfill Gas Extraction Well - Boring and Installation Log

Soil Gas Extraction Project

Project Name: Newberry County Landfill Date: Sunday, March 29, 2015

Project Number:

DRILLING

EW-23	Well Number or Name
28	Linear Feet of Drilling
27	Linear Feet of Completion
0	Linear Feet of Abandonment

Time In: _____ Time Out: _____

Weather Conditions:

Site Conditions

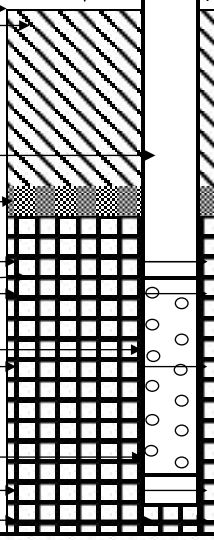
Comments:

WELL COMPLETION LOG

Top of Ground Elevation:	3
Backfill Material:	PORTLAND CEMENT GROUT
Length of Solid Pipe (bgs):	7
Bentonite Plug:	2
Length of Sand Pack:	21
Length of Slotted Pipe:	20
Style of Pipe:	PVC
Bottom of Bore:	28
Boring Diameter:	6

PVC slip Cap (temporary)

TOP Depths



MONITORING

Instrument Calibration Date:

Time	O_2	H_2S	LEL/CO	Date
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15:00				
16:00				
17:00				
18:00				
19:00				

Notes:

WELL BORING LOG

Depth (Feet)	Composition	Degree of Decomp	Estimated Degree of Moisture	Water Level (Feet BGS)	Temp (°F)
0-10					
10-20					
20-30					
30-40					
40-50					
50-60					
60-70					
70-80					
80-90					
90-100					
100-110					
110-120					
120-130					
130-140					
140-150					
Total Drilled Depth:					

Jon Dotterer 26-Apr

Owner Representative Date

Contractor Representative Date

CQA Technician Date

Dot Energy Solutions, Inc.

Landfill Gas Extraction Well - Boring and Installation Log

Project Name: Soil Gas Extraction Project
Newberry County Landfill

Date: Sunday, March 29, 2015

Project Number:

DRILLING

EW-24	Well Number or Name
30	Linear Feet of Drilling
29.5	Linear Feet of Completion
0	Linear Feet of Abandonment

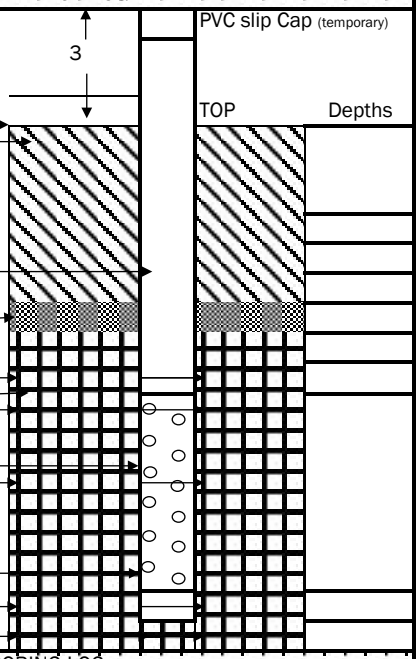
Time In: Time Out:

Weather Conditions: OVERCAST

Site Conditions WET

Comments:

WELL COMPLETION LOG



MONITORING

Instrument Calibration Date:

Time	O_2	H_2S	LEL/CO	Date
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Notes:

WELL BORING LOG

Depth (Feet)	Composition	Degree of Decomp	Estimated Degree of Moisture	Water Level (Feet BGS)	Temp (°F)
0-10					
10-20					
20-30					
30-40					
40-50					
50-60					
60-70					
70-80					
80-90					
90-100					
100-110					
110-120					
120-130					
130-140					
140-150					
Total Drilled Depth:					

Jon Dotterer 26-Apr

Owner Representative Date

Contractor Representative Date

CQA Technician Date

Dot Energy Solutions, Inc.

Landfill Gas Extraction Well - Boring and Installation Log

Soil Gas Extraction Project

Project Name: Newberry County Landfill Date: Sunday, March 29, 2015

Project Number:

DRILLING

EW-25	Well Number or Name
21	Linear Feet of Drilling
20	Linear Feet of Completion
0	Linear Feet of Abandonment

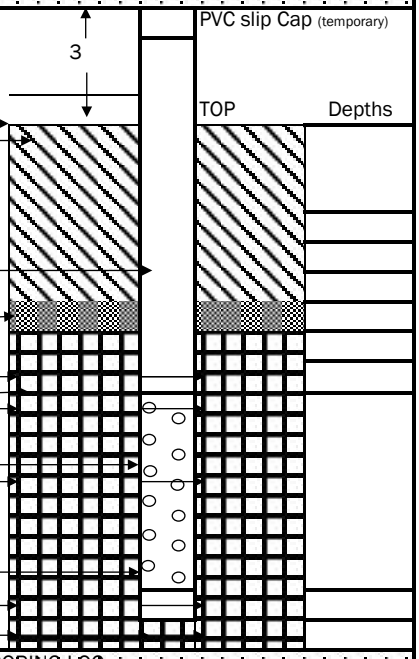
Time In: _____ Time Out: _____

Weather Conditions: OVERCAST

Site Conditions: WET

Comments:

WELL COMPLETION LOG



MONITORING

Instrument Calibration Date:

Time	O_2	H_2S	LEL/CO	Date
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19:00				

Notes:

WELL BORING LOG

Depth (Feet)	Composition	Degree of Decomp	Estimated Degree of Moisture	Water Level (Feet BGS)	Temp (°F)
0-10					
10-20					
20-30					
30-40					
40-50					
50-60					
60-70					
70-80					
80-90					
90-100					
100-110					
110-120					
120-130					
130-140					
140-150					
Total Drilled Depth:					

Jon Dotterer 26-Apr

Owner Representative Date

Contractor Representative Date

CQA Technician Date

Dot Energy Solutions, Inc.

Landfill Gas Extraction Well - Boring and Installation Log

Soil Gas Extraction Project

Project Name: Newberry County Landfill Date: Sunday, March 29, 2015

Project Number:

DRILLING

EW-26	Well Number or Name
31	Linear Feet of Drilling
30	Linear Feet of Completion
0	Linear Feet of Abandonment

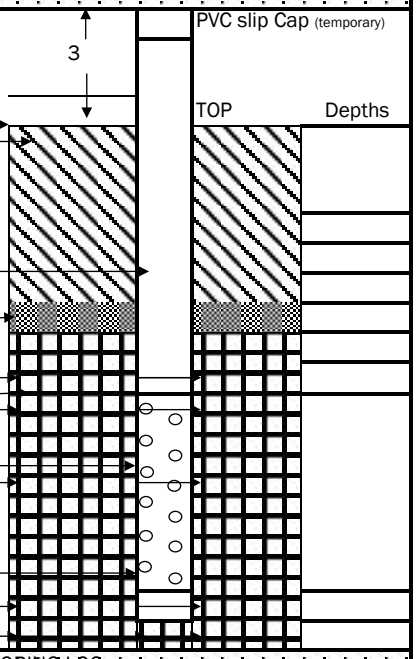
Time In: _____ Time Out: _____

Weather Conditions: OVERCAST

Site Conditions WET

Comments:

WELL COMPLETION LOG



MONITORING

Instrument Calibration Date:

Time	O_2	H_2S	LEL/CO	Date
7:00				
8:00				
9:00				
10:00				
11:00				
12:00				
13:00				
14:00				
15:00				
16:00				
17:00				
18:00				
19:00				

Notes:

WELL BORING LOG

Depth (Feet)	Composition	Degree of Decomp	Estimated Degree of Moisture	Water Level (Feet BGS)	Temp (°F)
0-10					
10-20					
20-30					
30-40					
40-50					
50-60					
60-70					
70-80					
80-90					
90-100					
100-110					
110-120					
120-130					
130-140					
140-150					
Total Drilled Depth:					

Jon Dotterer 26-Apr

Owner Representative Date

Contractor Representative Date

CQA Technician Date

Dot Energy Solutions, Inc.

Landfill Gas Extraction Well - Boring and Installation Log

Soil Gas Extraction Project

Project Name: Newberry County Landfill Date: Sunday, March 29, 2015

Project Number:

DRILLING

EW-26A	Well Number or Name
41	Linear Feet of Drilling
38	Linear Feet of Completion
0	Linear Feet of Abandonment

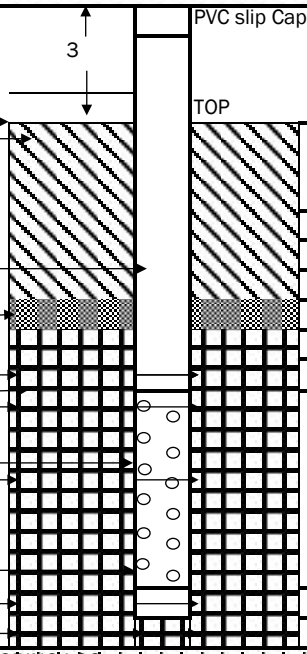
Time In: _____ Time Out: _____

Weather Conditions: OVERCAST

Site Conditions: WET

Comments:

WELL COMPLETION LOG



Top of Ground Elevation:	
Backfill Material:	PORTLAND CEMENT GROUT
Length of Solid Pipe (bgs):	7
Bentonite Plug:	2
Length of Sand Pack:	32
Length of Slotted Pipe:	31
Style of Pipe:	PVC
Bottom of Bore:	38
Boring Diameter:	6

MONITORING

Instrument Calibration Date:

Time	O_2	H_2S	LEL/CO	Date
7:00				
8:00				
9:00				
10:00				
11:00				
12:00				
13:00				
14:00				
15:00				
16:00				
17:00				
18:00				
19:00				

Notes:

WELL BORING LOG

Depth (Feet)	Composition	Degree of Decomp	Estimated Degree of Moisture	Water Level (Feet BGS)	Temp (°F)
0-10					
10-20					
20-30					
30-40					
40-50					
50-60					
60-70					
70-80					
80-90					
90-100					
100-110					
110-120					
120-130					
130-140					
140-150					
Total Drilled Depth:					

Jon Dotterer 26-Apr

Owner Representative Date

Contractor Representative Date

CQA Technician Date

Dot Energy Solutions, Inc.

Landfill Gas Extraction Well - Boring and Installation Log

Soil Gas Extraction Project

Project Name: Newberry County Landfill Date: Sunday, March 29, 2015

Project Number:

DRILLING

EW-27	Well Number or Name
40	Linear Feet of Drilling
39	Linear Feet of Completion
0	Linear Feet of Abandonment

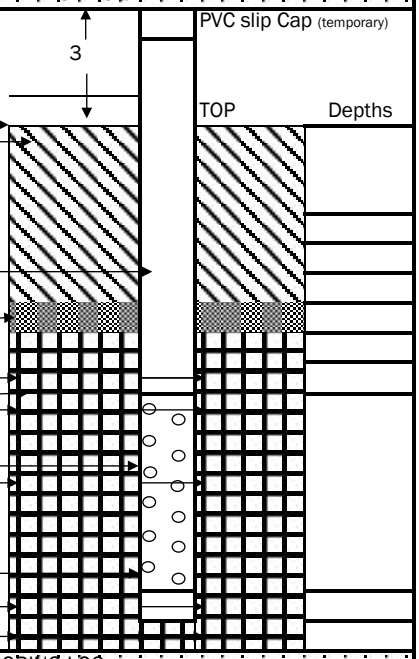
Time In: _____ Time Out: _____

Weather Conditions: OVERCAST

Site Conditions: WET

Comments:

WELL COMPLETION LOG



MONITORING

Instrument Calibration Date:

Time	O_2	H_2S	LEL/CO	Date
7:00				
8:00				
9:00				
10:00				
11:00				
12:00				
13:00				
14:00				
15:00				
16:00				
17:00				
18:00				
19:00				

Notes:

WELL BORING LOG

Depth (Feet)	Composition	Degree of Decomp	Estimated Degree of Moisture	Water Level (Feet BGS)	Temp (°F)
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70-80					
80-90					
90-100					
100-110					
110-120					
120-130					
130-140					
140-150					
Total Drilled Depth:					

Jon Dotterer 26-Apr

Owner Representative Date

Contractor Representative Date

CQA Technician Date

APPENDIX C

007

01010 Newberry soil gas extraction project 2014-31

geotech

Submittal: Enclosed SVE System with Geotech Environmental Control Module

Order # 424226
Customer Name: DOT Energy Solutions

2/10/2015

Table of Contents

DOCUMENTATION CONVENTIONS

This document uses the following conventions to present information:

An exclamation point icon indicates a **WARNING** of a situation or condition that could lead to personal injury or death. You should not proceed until you read and thoroughly understand the **WARNING** message.

A raised hand icon indicates **CAUTION** information that relates to a situation or condition that could lead to equipment malfunction or damage. You should not proceed until you read and thoroughly understand the **CAUTION** message.

A note icon indicates **NOTE** information. Notes provide additional or supplementary information about an activity or concept.

Section 1: System & Logic

System Overview

This submittal outlines a Soil Vapor Extractor (SVE) System housed within a protective enclosure, and equipped with a Geotech Environmental Control Module (GECM) to operate the SVE and fluid Transfer Pump. The GECM with include 3 timers, wired to interface with existing customer valves. The system will be equipped with an auto-dialer, wired to call programmed phone number upon system alerts.

Soil Vapor Extractor and Transfer Pump Overview

The Geotech Soil Vapor Extractor (SVE) System is designed for soil degassing and subsurface ventilation applications in the unsaturated zone (above the water table) where the contaminates have a tendency to volatize or evaporate easily.

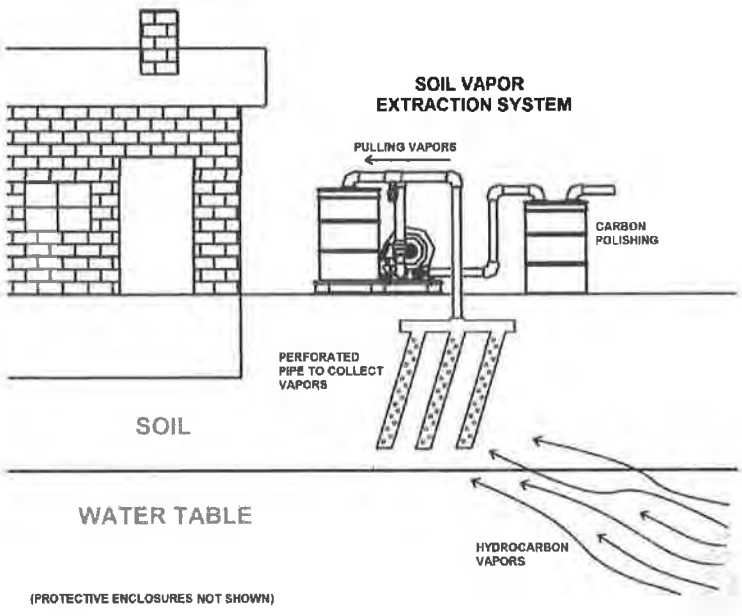


Figure 1-1

SVE, sometimes called in-situ volatilization or enhanced volatilization, works by pulling air through ground that has been saturated with hydrocarbon (Figure 1-1). This causes volatile organic compounds (VOC's) and some semi-volatile compounds (SVOC's) to vaporize. These vapors are then carried through the extraction well ductwork to the atmosphere. Often, in addition to vacuum extraction wells, air injection wells are included to increase the air flow and improve the removal rate of the contaminant. An added benefit of introducing air into the soil is that it can stimulate bioremediation of some contaminates. The system is ideal for well point or trench type vapor barriers. If off gas treatment is required, contact Geotech for information on air treatment equipment.

The SVE and transfer pump will be housed inside a 56" x 56" x 55" protective enclosure. The transfer pump will turn on and off based on the fluid levels within the SVE knockout tank.

SVE Components & Features

Blower

Skid mounted, aluminum fan regenerative blower, Ametek Rotron Model # EN858BD72WL, 10HP, 230 VAC, 3PH, XP with Thermal Overload Protection

Performance: Flow range 150-400 ICFM, Max Vac. 90" W.C.

Vacuum Gauges

Vacuum gauges, 0-100PSI, are mounted before and after the air filter for ease of diagnosing a clogged filter. As the filter begins to clog, the difference between gauge readings will increase.

Ambient Air Dilution Valve

The ambient air ball valve is used to manually adjust the vacuum on the influent side of the blower.

Moisture Separator

The moisture separator is positioned between the blower and the extraction well to help protect the blower from corrosion damage caused by excess moisture. In addition, it will protect the end treatment from further contamination. Each moisture separator provides the following features:

- 37 gallon (140 L) capacity, steel canister with enamel finish and epoxy coated interior.
- High efficiency cyclonic separation.
- Inherent safe collection design.
- Outfitted with drain for convenient removal of fluids.
- A high liquid level float switch that will protect the blower from flooding and shut down the system when the moisture separator is full.

Included Options

- Particulate Air Filter
- HI Vacuum switch to protect the blower from overheating by detecting a blockage in the line

Transfer Pump

This SVE system is equipped with a ½ HP effluent transfer pump to automatically pump water from the moisture separator.

The GECM LCD display reads, "XFER".

3-Position Level Control Probe

Knockout Drum equipped with a liquid level Site Tube assembly with 3-position level probe to control Transfer Pump ON/OFF.

Geotech Environmental Control Module Overview

This Geotech Environmental Control Module (GECM) is a specifically designed, microprocessor based, industrial control panel for the operation of the SVE Blower and Transfer Pump. 230V, 3ph electrical power will be used to run the GECM.

This system is configured to operate the SVE System, as well as integrate with existing customer hardware. The GECM will be mounted on the exterior of the protective enclosure for easy access to controls.

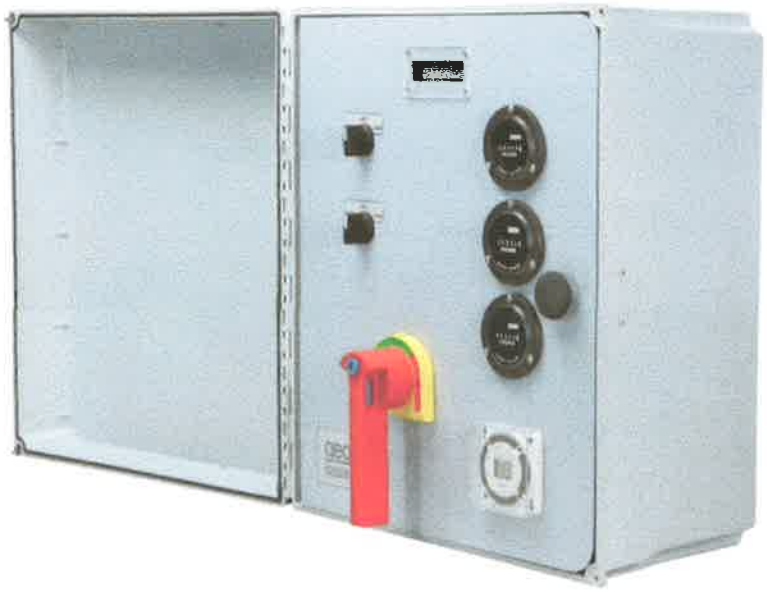


Figure 1-4, Example GECM, shown with LCD Display, HOA switches, timers, and a fused disconnect

GECM Components & Features

This GECM is with the following features to meet site and customer requirements:

- All components are housed in an easy to install weatherproof NEMA 4X (IP66) enclosure.
- A bright 16 x 2 character Liquid Crystal Display (LCD) shows users exactly what is happening with each individual component within the system. For example, a probe's float position or an output device's ON/OFF status can easily be viewed on the display day or night.
- Hand-Off-Auto (HOA) switch controls for direct control over SVE Blower and Transfer Pump.
- Green Run lights for SVE and Transfer Pump.
- Red Alarm light for system faults and reset conditions.
- 3 electromechanical timers, each to operate a customer supplied solenoid valves.
- Sensaphone Model 400 Autodialer for phone call alerts to customer.

The GECM will come with an Installation and Operation Manual containing wiring and device specifications unique to the unit's application. The GECM Field Wiring Diagram attached with this submittal illustrates the internal layout of the GECM panel and also contains wiring information pertinent to device installation.

RESET Button

The GECM is designed to automatically shut down the system and associate devices whenever a fault or condition occurs. Once the fault or condition has been corrected the system can be easily turned back on by depressing the RESET button. This will clear the fault and automatically turn on any equipment still set to AUTO. If you do not want a given device to turn back on, then set the appropriate switch to OFF prior to using the RESET button.

Momentarily pressing the RESET button may also restore a blank or faulty display. However, contact Geotech should display problems occur that will not clear up with this method.

Additional System Components

Tankfull Probe for customer supplied 1000 gallon poly tank, with 50' of cable (shipped loose)

Section 2: System Logic

DOT Energy Solutions

Logic Description

The logic description for the SVE operating conditions and alarms is as follows:

For the SVE portions a High Vacuum Switch will shut down the SVE and the red alarm light will illuminate as well as read out the alarm condition on the LCD screen. The alarm condition is set up as a latching control, i.e.; a manual reset is required.

The SVE motor thermal overloads are tied to an alarm switch. Therefore the alarm switch light will illuminate and shutdown the system in the event of a blower motor thermal overload. The red alarm light will illuminate as well as read out the alarm condition on the LCD screen. The alarm condition is set up as a latching control, i.e.; a manual rest is required.

The SVE system includes a knockout (KO) tank condensate transfer pump. The system is configured with a 3 position level control probe in the KO vessel site tube assembly. The 3 position probe will be float activated for HI-HI, HI and LO position. In the LO position, the transfer pump will not be activated. In the HI position, the transfer will be activated and will turn on and pump out the KO vessel until the LO float is in the complete down position. The transfer pump will turn off and not be activated until the HI position float rises and signals for the transfer pump to turn on. During this series of events, the SVE blower will continue to operate.

If the HI-HI float rises and is activated, it will signal for the blower to shut down, preventing the blower from ingesting fluid. The red alarm light will illuminate as well as read out the alarm condition on the LCD screen. The alarm condition is set up as a latching control, i.e.; a manual rest is required.

Included with the system is a tankfull shut off switch to be installed in the customer supplied 1000 gallon poly tank. In the event of a tank full condition, the red alarm light will illuminate as well as read out the alarm condition on the LCD screen. It will signal for the blower to shut down. The alarm condition is set up as a latching control, .i.e.; a manual reset is required.

The GECM is interfaced with a Sensaphone Autodialer. When any of the above alarm conditions exist, the Sensaphone with dial out to customer supplied phone number(s) to inform the customer of the specific alarm condition. All telephone services, installation, etc. are the responsibility of the customer.

The GECM controller has an LCD screen to identify operating and alarm conditions. Devices are controlled through HOA (Hand/Off/Auto) switches. Green run lights will indicate power supplied to a device, and a common red alarm light is provided to indicate an alarm conditions exists.

LCD Display Definitions

System status, condition and fault messages are shown on Line 1, while device status will be displayed on Line 2. Fault and condition messages will require a system inspection and that the device be reset at the GECM. Use this section to troubleshoot any fault or condition messages.

SVE with XFER Pump Displays (system with 3 position probe) –

Line 1 messages:

```
SVE: Lx Hx
SVE: HIHI  (condition)
SVE: HI VACUUM   (fault)
SVE: PROBE FAULT (fault)
SVE: TANKFULL    (fault)
SVE: THERM OL    (fault)
```

Line 2 messages:

```
BLWRnnnnXFERnnnn
```

where,

x =	H (high), M (middle), or L (low)
nnnn =	ON, OFF or HAND

Inputs/Outputs Logic Table

The logic table below lists the inputs, outputs, and specific display definitions per condition:

Logic Table

System: (1) SVE with 3-position Probe & GECM_SO#424226

Condition	Inputs								Outputs					
	Vacuum Hi	Level Control LO	Level Control HI	Level Control HI-HI	SVE Blower Thermal	External Tankfull	BLWR Hand/Off/Auto Switch	XFER Hand/Off/Auto Switch	Display		SVE Blower & Green Run Light	Xfer Pump & Green Run Light	Red Alarm Light	Sensaphone Autodialer
System OFF, Level Control Probe in air	NC	NC, held open	NO	NO	NC	NC	-	-	-		-	-	-	
BLWR HAND	-	-	-	O	C	-	HAND	-	SVE Lx HL BLWRHAND XFERnnnn		ON	OFF	OFF	NO
XFER HAND	-	-	-	-	-	C	-	HAND	SVE Lx Hx BLWRnnnn XFERHAND		OFF	ON	OFF	NO
BLWR AUTO XFER AUTO	C	O	O	O	C	C	AUTO	AUTO	SVE LL HL BLWR ON XFEROFF		ON	OFF	OFF	NO
	C	C	O	O	C	C	AUTO	AUTO	SVE LM HL BLWR ON XFEROFF		ON	OFF	OFF	NO
	C	C	C	O	C	C	AUTO	AUTO	SVE LH HL BLWR ON XFER ON		ON	ON	OFF	NO
	C	C	O	O	C	C	AUTO	AUTO	SVE LM HL BLWR ON XFER ON		ON	ON	OFF	NO
	C	O	O	O	C	C	AUTO	AUTO	SVE LL HL BLWR ON XFEROFF		ON	OFF	OFF	NO
XFER AUTO BLWR OFF	C	C	C	O	C	C	OFF	AUTO	SVE LH HL BLWROFF XFER ON		OFF	ON	OFF	NO
	C	C	O	O	C	C	OFF	AUTO	SVE LM HL BLWROFF XFER ON		OFF	ON	OFF	NO
	C	O	O	O	C	C	OFF	AUTO	SVE LL HL BLWROFF XFEROFF		OFF	OFF	OFF	NO
BLWR AUTO XFER OFF	C	O	O	O	C	C	AUTO	OFF	SVE LL HL BLWR ON XFEROFF		ON	OFF	OFF	NO
	C	C	O	O	C	C	AUTO	OFF	SVE LM HL BLWR ON XFEROFF		ON	OFF	OFF	NO
	C	C	C	O	C	C	AUTO	OFF	SVE LH HL BLWR ON XFEROFF		ON	OFF	OFF	NO
FAULT: HI-HI	C	C	C	C	C	C	AUTO	HAND/OFF /AUTO	SVE HIHI BLWR OFF XFER OFF	Manual Reset Required for Fault Conditions	OFF	OFF	ON	YES
FAULT: Hi Vac (PS)	O	-	-	-	C	C	-	-	SVE HI VACUUM BLWR OFF XFER OFF		OFF	OFF	ON	YES
FAULT: Probe Fault	-	C/O	O	C	-	C	-	-	SVE PROBE FAULT BLWR OFF XFER OFF		OFF	OFF	ON	YES
FAULT: Blower Thermal	-	-	-	-	O	C	-	-	SVE BLWR THERM BLWR OFF XFER OFF		OFF	OFF	ON	YES
FAULT: Tankfull	-	-	-	-	-	O	-	-	EXT. TANKFUL BLWR OFF XFER OFF		OFF	OFF	ON	YES

Section 3: System Installation & Operation

Disconnect power before opening any enclosure on any system. Only explosion proof systems may be deployed in hazardous locations.

System Installation

Inspection

Inspect all components for physical damage. Installing and operating damaged equipment is dangerous and should not be performed. Verify that all components have arrived as per the Sales Order or packing list.

Location

- Locate and position the unit as desired. Secure the unit to a solid floor or other stable surface keeping the unit relatively level (within 1/8"/3.2 mm per 12"/30.5 cm run.)
- When bolting the unit down all mounting points are to be solidly in contact with the floor before the anchor bolts are tightened. The use of vibration isolators is not required with SVE less than 25 HP in size.
- There should be adequate room around the unit to perform regular maintenance. Adequate ventilation should also be available; Blower(s) generate BTU's per hour per motor horsepower in heat which needs to be removed. Geotech recommends a 3' (1 m) space around the enclosure for heat rejection and ease of maintenance.
- Even though the GECM electronics are enclosed within a NEMA 4 rated weatherproof box, it is advised that you place your GECM within a sheltered area, protecting the unit from direct exposure to water and sunlight.

Plumbing

- Plumb in the inlet and outlet piping. Size the piping such that the pressure drop encountered during maximum air usage is within an acceptable range.
- Utilize piping materials that are rated for pressure and temperature at which the blowers/compressors will be operating.
- Route the piping such that any moisture that condenses in the piping will run to a low point drain.
- Confirm the installed pipe system meets all applicable building codes.
- SVEs are to be manifolded to the vapor source and the effluent vapor plumbed to a desired location.

Input Power Guidelines

All wiring must be carried out by a qualified electrician and be in accordance with the state and local codes. Conduit runs must conform to current U.S. National Electrical Code (NEC). Do not run any power wires within 2 inches (5 cm) of intrinsically safe (IS) wires or terminals (NEC Article 508 for

relevant codes.) All equipment and controls are to be installed in accordance with Article 430 and 504 of the NEC.

See also the GECM Field Wiring Diagram for specific connections to the back panel and Printed Circuit Board (PCB). Geotech provides a detailed Field Wiring Diagram with every GECM built. Copies of these diagrams can be obtained from Geotech when needed.

Access Ports and Conduit Hubs

When installing a GECM enclosure ensure that ports installed for IS wiring are placed within the upper sides of the enclosure (close to the PCB) and that all conduit hubs for main power, blowers, and pumps are installed along the bottom. To maintain the NEMA 4 weatherproof characteristics of your panel use weatherproof conduit hubs.

Install Chassis Ground

Before beginning the panel hookup procedures, run a wire from the bottom ground lug on the GECM back panel to a good earth ground, i.e., the circuit breaker panel enclosure.

Install IS Ground

Connect IS ground wires to the upper ground lug on the GECM back panel.

Wire Main Power

This GECM is built to run with three phase 230VAC. Incoming power leads are connected to a terminal strip labeled L1, L2 and L3.

Power to Motor Starters

Motor starters are installed to the back panel when the GECM is built. Main power for the individual motor starters is run through the bottom of the enclosure. Each motor starter is labeled for the device they support. Three phase power leads are attached to terminals L1, L2, and L3. All ground wires attach to the ground lug at the bottom of the panel.

DO NOT run power wires within two inches of IS wiring or terminals.

Operation

SVE Operation

To ensure proper operation of the system, the vacuum on the influent air should not exceed the manufacturer's high vacuum switch setting. An adjustable high vacuum switch is pre-set at the factory to shut down the blower when the vacuum exceeds the blower rating or nameplate full load amps. Vacuum in excess of the specified values can over heat and damage the blower motor. Monitor the vacuum by referring to the vacuum gauge mounted closest to the blower (or the piping between the drum and AIR IN port of the blower.

The specified maximum vacuum indicated on the blower identification plate assumes an open discharge. Any pressure drop associated with inlet or discharge piping or discharge treatment will also affect blower motor running amperage. Therefore, maximum allowable vacuum will decrease with an increase in discharge pressure requirements (such as use with vapor treatment equipment, i.e.: carbon vessels.)

An adjustable PVC inlet air valve is also provided. This valve should be open on startup and slowly closed until the desired vacuum is attained or maximum recommended vacuum is attained.

System Faults (SVE)

To prevent equipment damage, the SVE System will automatically shut down due to the following conditions:

High Vacuum

- Clogged demister.
- Obstructions (water or debris) in the influent or effluent plumbing.

High Water Level in the Moisture Separator Drum

- Water level in the moisture separator drum has reached capacity.
- Transfer pump not removing water.

Blower Motor Thermal Overload (overheating)

- Incorrect setting of vacuum switch.
- Motor failure or fatigue.
- Electrical service providing excess or insufficient voltage.

Current Overload (High Amps)

Motor starters provided with factory control panels will shut the system down when the amp range is exceeded.

- Incorrect setting of vacuum switch.
- Motor failure fatigue.
- Electrical service providing excess or insufficient voltage.
- Amp range setting on motor starter has been altered (consult electrician).

Restarting the Blower

To restart the system after one of the above faults has occurred; first identify and rectify the condition that caused the fault (see Section 5, System Troubleshooting). Once the problem has been corrected restart the blower:

Set the switch on the control panel to OFF, or set the main switch to OFF.

Systems with an ON/OFF/RESET switch require a RESET.
Systems using a GECM Control Panel (optional) require that the HOA (HAND/OFF/AUTO) switch be set to OFF and the RESET button depressed to clear the fault.

Set the switch on the control panel to ON, or set the main switch to ON.

With a GECM, set the HOA switch to AUTO.

GECM Operation

Before wiring power the control panel, check to make sure the electrical supply matches the specifications of the system and components. Utilize a volt meter to verify the **actual power** supplied. Do not rely on the power supply stated on the electrical supply panel since actual voltage provided can vary widely.

Wire in main power and tankfull probe with the proper gauge wire recommend by NEC handbook.

Double check for correct rotation on all equipment prior to putting the equipment into service.

Activate all control instrumentation to ensure functionality of switches and equipment protection prior to full operation of the system.

System Controls (GECM Control Panel)

On the GECM, each device is controlled with a HAND/OFF/AUTO (HOA) switch. During normal operation, all devices are set to AUTO for continuous run time. Should a system fault (alarm condition) occur, a RESET of the panel will be needed prior to turning the equipment back on. The HAND position is used to temporarily apply power to a system, such as to verify rotation or when trouble shooting a problem.

Section 4: System Maintenance

SVE Maintenance

The SVE is designed to provide you years of trouble-free operation when the equipment is properly maintained. Some basic maintenance items are listed in the following table:

Frequency of Maintenance Tasks/Monthly Calendar												
	1	2	3	4	5	6	7	8	9	10	11	12
Check vacuum gauges to ensure that max. vacuum is not exceeded.		•		•		•		•		•		•
Inspect air filter on optional CFM gauge for moisture. Drain high vacuum switch.	•	•	•	•	•	•	•	•	•	•	•	•
Check motor amp draw. Check all switches for proper operation. Check all wiring for loose connections.			•			•			•			•
Check water level within the moisture separator drum. Check operation of transfer pump.	•	•	•	•	•	•	•	•	•	•	•	•
Check for loose fittings and bolts.			•			•			•			•
Check moisture separator for pressure drop across filter/moisture demister (pressure drop should not exceed 6" H^2O (0.44 in Hg). under normal operating conditions.)			•			•			•			•

Cleaning the intake filter/demister assembly (for standard 37 gallon drum)

Optimum performance of the SVE system is possible only with regular maintenance of the intake filter/demister. Clean the filter/demister assembly inside the moisture separator whenever the vacuum gauge readings indicate significant clogging has occurred. Refer to Figure 4-1 and the following outlined procedure:

- Loosen and remove the drum lid retaining clamp.
- Loosen and disconnect the 3 inch union between the moisture separator drum and the blower.
- Mark and detach any CFM lines (when applicable).
- Lift the cover off the drum and lay it down with the demister assembly facing up.
- Remove the demister from the holding tube.
- Shake excess liquid from the demister unit and wash with warm soap and water.
- Reassemble the moisture separator.

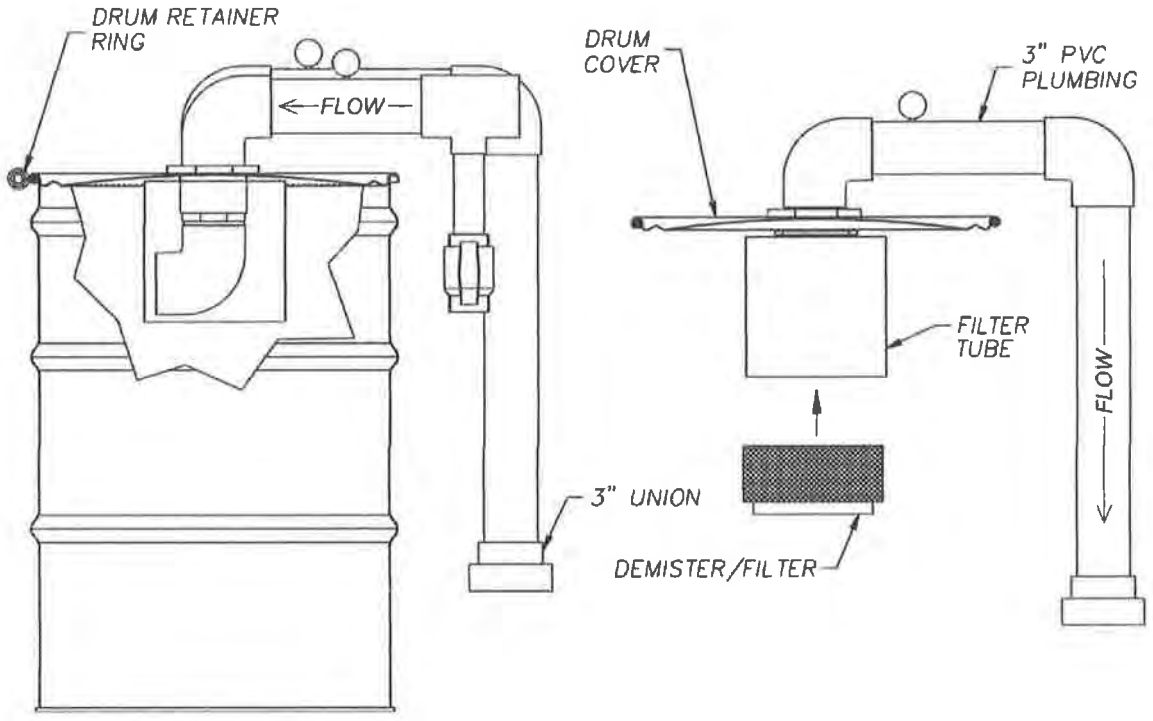


Figure 4-1 Soil Vapor Extractor Maintenance Visual Aid

Drain Vacuum (Pressure) Switch

The SVE HI vacuum switch should be drained on a regular basis. This is particularly important in applications where excessive condensation may cause a buildup of moisture within the switch. To drain the switch, rotate the vent drain plug (underneath) one turn in a clockwise direction and then return the plug to its original position.

Drain CFM Gauge Air Filter

The filter on the CFM gauge should be checked on a regular basis and drained if necessary. Drain the filter by turning the drain screw (underneath) in a clockwise direction (when viewed from the bottom of the filter) Close the drain by turning the screw counter-clockwise.

Check Poly Tubing

Regularly check the condition of the poly tubing going from CFM gauge to Pitot tube and between the HI vacuum switch and the quick connect fitting on the influent air piping. A cut, kink or loose tubing connection can cause operational problems with the SVE.

Operation of the High Vacuum Switch

Though the High Vacuum switch is called out as a "pressure" switch, and can be used as such, its application on the SVE system is to be used as a "vacuum" (negative pressure) switch. When you see

the word "pressure", assume "vacuum" unless the step is defining a physical port on the switch itself, in which case the word "pressure" is used.

SVE "High Vacuum" (pressure) switch

The High Vacuum switch used is always wired for "normally closed". The switch will remain closed until you adjust the vacuum setting screw to have the switch "open" at a specific vacuum (negative pressure) reading (in inches) as shown on the vacuum gauge (normally the gauge on the influent piping closest to the blower AIR IN port.) This is achieved by turning the set screw clockwise (CW) for a higher setting, counter-clockwise (CCW) for a lower setting. When this setting is reached, the electrical contact will "open", breaking the circuit (and in most applications, shutting the system down).

High Vacuum Switch Setting

High Vacuum switch is pre-set at the factory. It is normally set 2" H^2O (0.15 in Hg) below the vacuum gauge reading for the maximum amps called out on the blower nameplate. The purpose of this setting is to shut down the system and prevent over-amping of the blower (in case of clogging to the influent air path) while maximizing the air flow, or CFM. Before proceeding with an adjustment, read the literature provided that came with the switch from the manufacturer.

Transfer Pump

The following routine maintenance tasks will help to ensure continuous service from the transfer pump. Read the manufacturer supplied User Manual before proceeding.

- Check the flow rate weekly to ensure that the cycling frequency is minimized.
- Inspect hoses and wiring quarterly for cracks, cuts or abrasions.

Section 5: Troubleshooting Guide

Service Locations

Geotech Service personnel are trained on all aspects of the equipment and are dedicated to help you maximize the efficiency and cost effectiveness of your SVE system. For technical support call our Geotech Service office.

Geotech Environmental Equipment, Inc.
2650 East 40th Avenue
Denver, CO 80205
Toll Free Phone: (800) 833-7958
Commercial Phone: (303) 320-4764
Fax: (303) 322-7242
www.geotechenv.com

Your SVE System is designed for years of continuous trouble free operation. If you encounter problems when using either system, use the following guidelines before contacting Geotech for service.

These procedures are meant to be carried out by personnel qualified to work on electrical circuitry. If in doubt, obtain the services of a qualified electrician.

Getting Help

Read the entire manual and become thoroughly familiar with all system components before initiating any of the following troubleshooting procedures.

If the troubleshooting procedures in this section indicate a component failure, prepare a written list of all problems encountered while operating the equipment, then call Geotech Environmental Equipment for assistance.

SVE

If the blower will not run:

- Confirm that power is reaching the motor.
- Check all wiring and connections for breaks, faults, or abrasions.
- Check for power outages at the service.
- Check fuses.
- Check for a tripped motor starter, try pressing the "RESET" button on motor starter

Use the following steps to determine if the motor/blower has shut down due to any of the fault conditions:

Check for high liquid level in the site glass assembly attached to the moisture separator drum. If the High Liquid Level switch has engaged and has shut down the system, verify the functionality of the

transfer pump and the optional level control probe. Check for any potential plugging due to sediment around the discharge piping from the vessel.

Inspect the demister filter inside the moisture separator drum. A blocked filter will engage the High Vacuum switch. If the filter is dirty, clean as indicated in Section 4.

If the High Vacuum switch setting is shutting the system off prematurely, then adjust the setting as described in Section 4.

Restart the blower. Monitor the current draw using a voltmeter and compare your reading with the motor nameplate amps. Verify that the current is within acceptable limits. If the motor is drawing excess current, please contact Geotech.

If your system does not respond to any of the procedures above, the motor has probably shut down due to thermal overload. Overworking the blower can cause thermal overload; or it may be a symptom of motor fatigue. Allow the motor to cool, and then restart the system.

If the blower continues to overheat, monitor the vacuum gauges and determine if the blower is exceeding its maximum vacuum limit. If the blower has not exceeded its vacuum limit, please contact Geotech for further assistance.

GECM

Use this section, in conjunction with the System I/O Logic Table with Display definitions, to troubleshoot any occurring system problems.

The RESET button must be depressed to clear a system fault or condition. This will also automatically restart any devices still set to AUTO.

No Apparent Power to the GECM –

- Check all incoming wire connections.
- Check fuses and breakers at power source. (Fuses can also be found on the GECM PCB. These can blow from a voltage spike or incorrect voltage applied to the GECM. Allow a Geotech technician to service these fuses.)

No Display –

- Press RESET button (also used to clear up garbage on screen).
- Fuse is blown in the GECM PCB or faulty electronics. Return to Geotech for service.

Blower Will Not Run –

- Check device status at GECM.
- Check for blown fuses.
- Check wire connections between device and GECM.
- Check motor for over-heating.
- HI vacuum switch preventing unit from starting up.

Transfer Pump Will Not Run –

- Check device status at GECM.
- Check for blown fuses.
- Check wire connections between device and GECM.
- Check motor for over-heating.
- Check 3-position probe floats and verify that nothing is obstructing their movement.
- Check probe wiring to GECM.
- Pump may have over-amped due to obstruction in flow line. Clear line and restart pump.

Transfer Pump Will Not Shut Off –

- Check 3- position probe floats and verify that nothing is obstructing their movement.
- Check probe wiring to GECM.

High Vacuum Message or Switch Not Working –

- Verify wiring connections between GECM and switch.

Probe Fault –

- This error will occur when the HIHI float is in the up position and the HI/LO float is in the down position. Check for free movement on all floats.
- A switch wire may have become disconnected or broken.

Tankfull Message –

- Product recovery tank is full.
- A switch wire may have become disconnected or broken.

Section 6: System Specifications, Bill of Materials, & Schematics

System

Protective Enclosure Dimensions: 56" x 56" x 55" (142 cm x 142 cm x 140 cm)

SVE

Applications: Well point or trench type vapor barriers.

Product Recovery: Volatile Organic Compounds

Internal Skid Dimensions: 65" H x 48" W x 40" L (165.1 cm H x 121.9 cm W x 101.6 cm L)

SVE Blower:

Manufacturer/Model:	Ametek Rotron, Model # EN858BD72WL ✓
Type:	Aluminum Fan Regenerative blower
Flow Rate:	150-400 ICFM
Max. Vacuum:	90" W.C.
Voltage:	230V AC
HP:	10 HP
Phase:	3 PH
Hz:	60 Hz

SVE Accessories:

- 3-position Fluid Level Probe/Sensor
- High Vacuum Switch
- 2 Vacuum Gauges
- Thermal Overload Protection

Transfer Pump:

Manufacturer/Model:	Goulds, Model # 10141
Voltage:	230V AC
HP:	½ HP
Phases:	3 PH
Hz:	60 Hz

GECM

Applications: Customizable control panel for remediation systems

Electrical: 230VAC input power, 10 Watts
Schematic provided separately

Environmental Conditions: 0-104° F (-17.8 - 40° C)

Main enclosure:	NEMA 4X (IP66)
Enclosure material:	Fiberglass
External Dimensions:	18" H x 16" W x 10" D (45.7 cm x 40.6 cm x 25 cm)
Weight:	15 to 45 lbs. (6.8 to 20 kgs) (depending on installed options)

Bill of Materials, Major Components

System Component	Qty	Geotech Part Description	Geotech Part #
Protective Enclosure			
Enclosure	1	DRUM HAZMAT STATION,56X56X55, 4 DRUM (DENIOS)	76500026
SVE			
Skid	1	PALLET, METAL, 48 x 40, POWDER COATED	16110178
Blower	1	BLOWER, 10HP, 230/460V,3PH, EP	10782
Transfer Pump	1	TRANSFER PUMP, 1/2HP, 230V, 3PH, 1ST1C7F4, XP	16091307
Vacuum Gauge	2	GAUGE, VACUUM, 0-100", 1/4"	PPP092007
Hi Vacuum Switch	1	SWITCH, PRESS, 10-180"WC, H3A-1SL, XP, AIR/100 PSI MAX	16090265
Knockout Drum	1	DRUM, 55GAL, STEEL, EPOXY LINED, BLUE	10759
Moisture Separator	1	TUBE, MIST ELIMATOR, PAINTED	10760
Site Tube	1	SIGHT TUBE ASSY, 1, 2, 3'	2100037
3-POS Level Control Probe	1	PROBE, TRANSFER TANK, 32"L	2950524-01
GECM			
Motor Starter, Blower	1	MOTOR STARTER, 2-4A, 230V, 3PH, 115V COIL	16110060
Motor Starter, Pump	1	MOTOR STARTER, 22-32A, 230V, 3PH, 115V COIL	16110064
HOA Switches	2	HOA SWITCH	16110042
Green Run Light	2	INDICATOR LIGHT,GREEN,GECM	16110112
Red Alarm Light	1	INDICATOR LIGHT,RED,GECM	16110088
Electrical Transformer	1	TRANSFORMER, 50V, 460 TO 230V	16090100
24hr Timers	3	TIMER, EM, 1 POLE, 120V, 24 HOUR, 2A517	16110138
Telemetry	1	SENSAPHONE, AUTODIAL, MODEL 400	16110111
Auxiliary Equipment			
Tankfull Probe	1	TANKFULL PROBE, NO CONN (supplied with 50' of cable)	2390073

Manufacturer's manuals and equipment information attached separately.

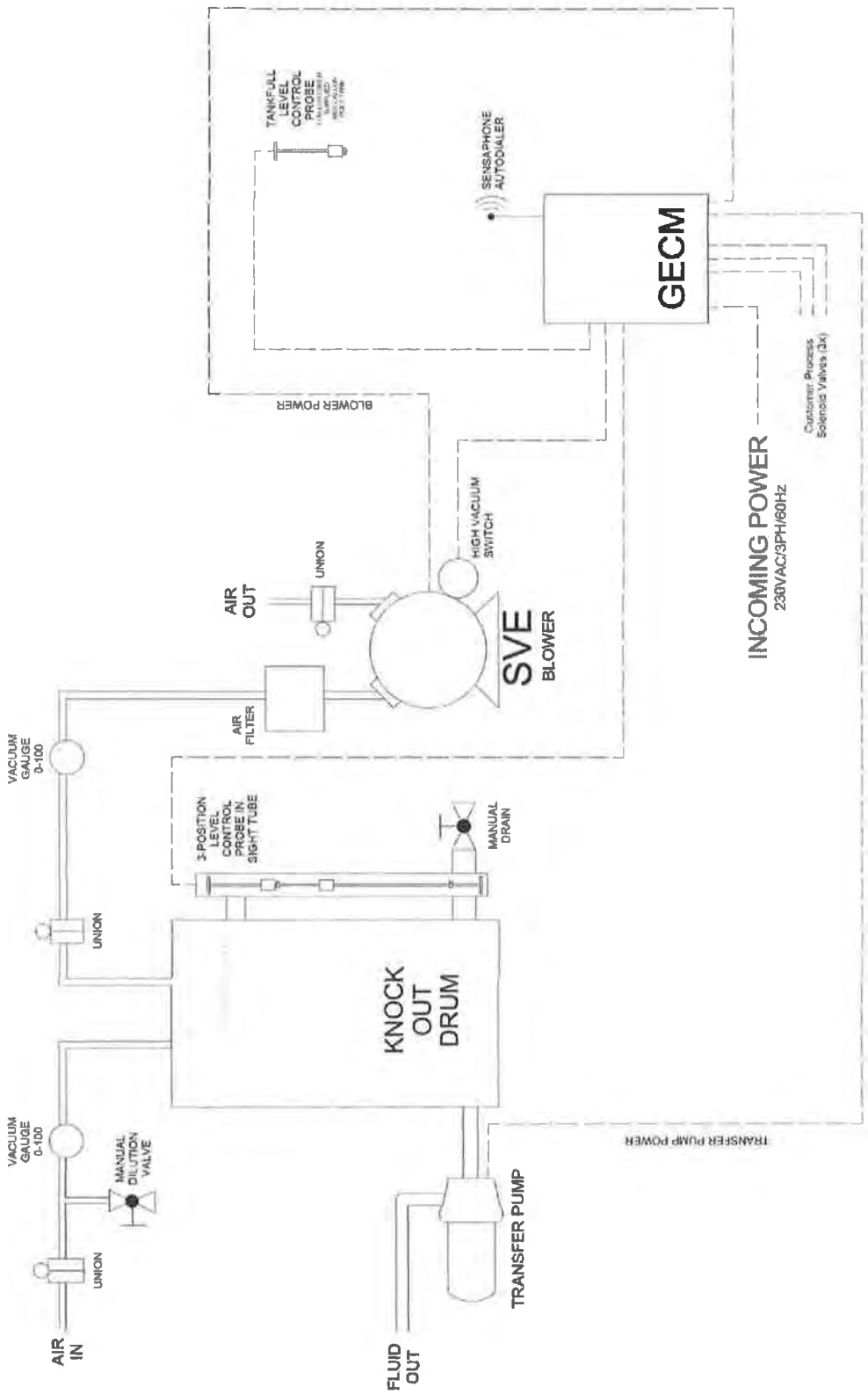


Figure 6-1, P&ID for DOT Energy Solutions

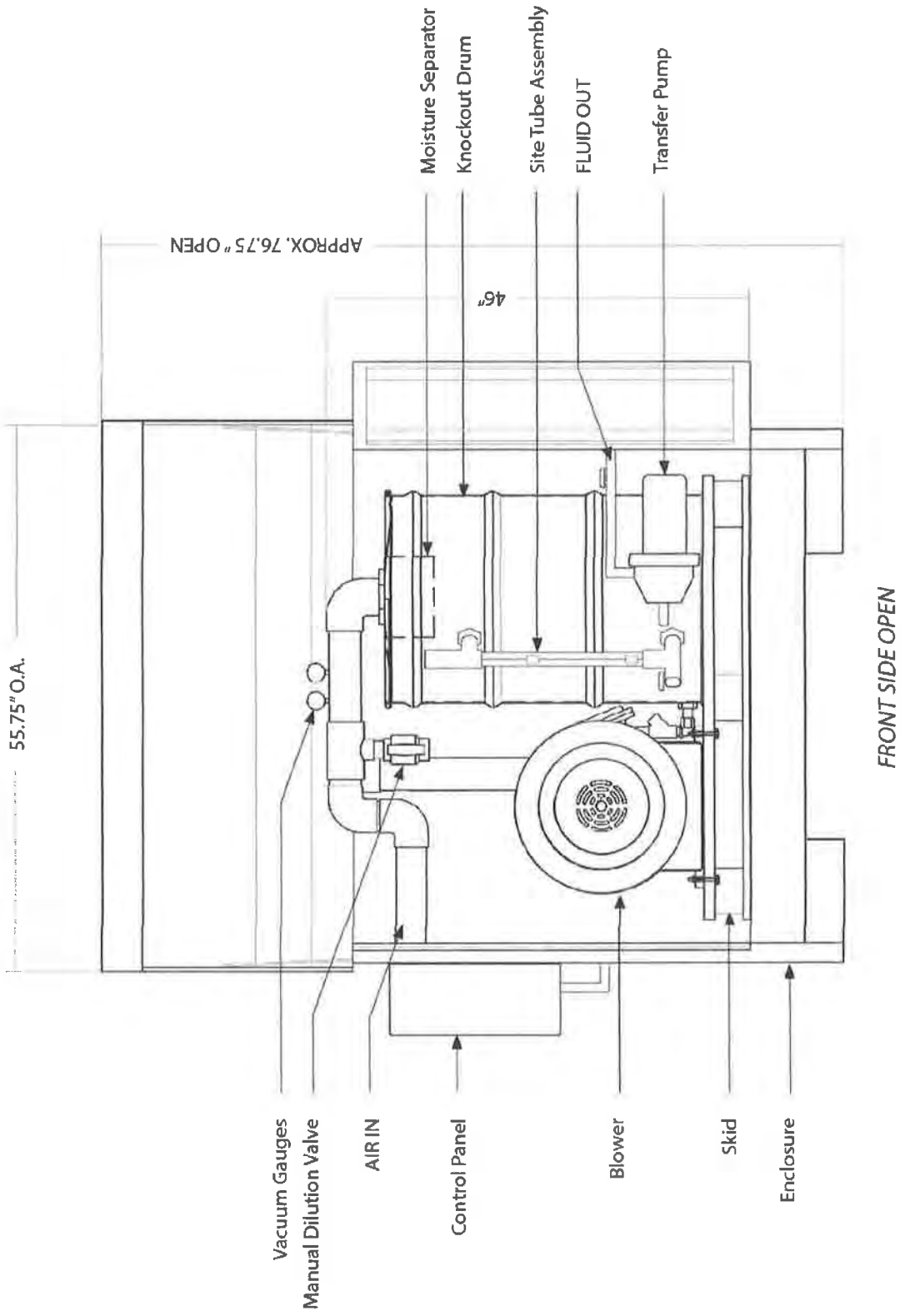


Figure 6-2, System Process Layout in Enclosure, Front View

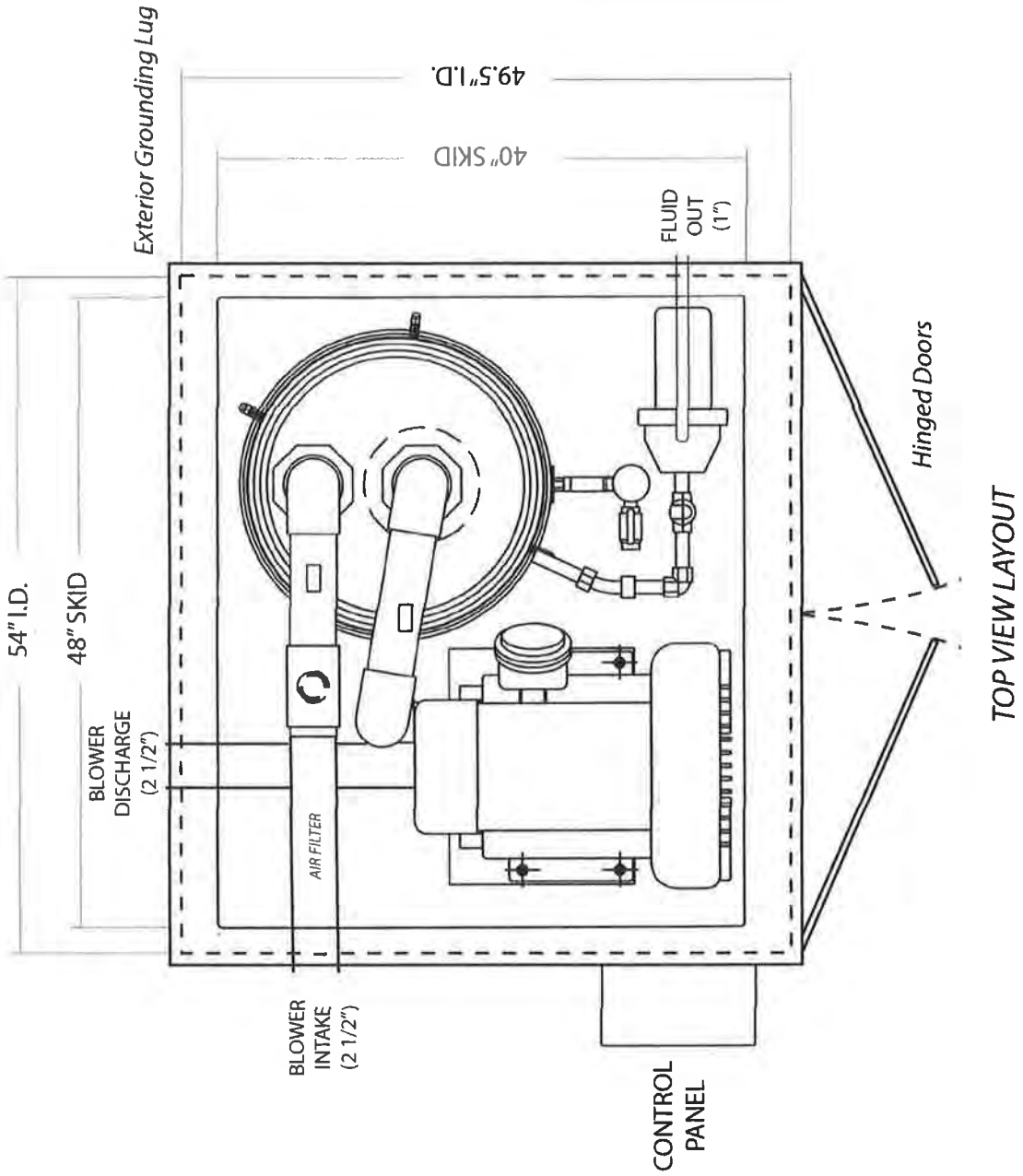


Figure 6-3, System Process Layout in Enclosure, Top View

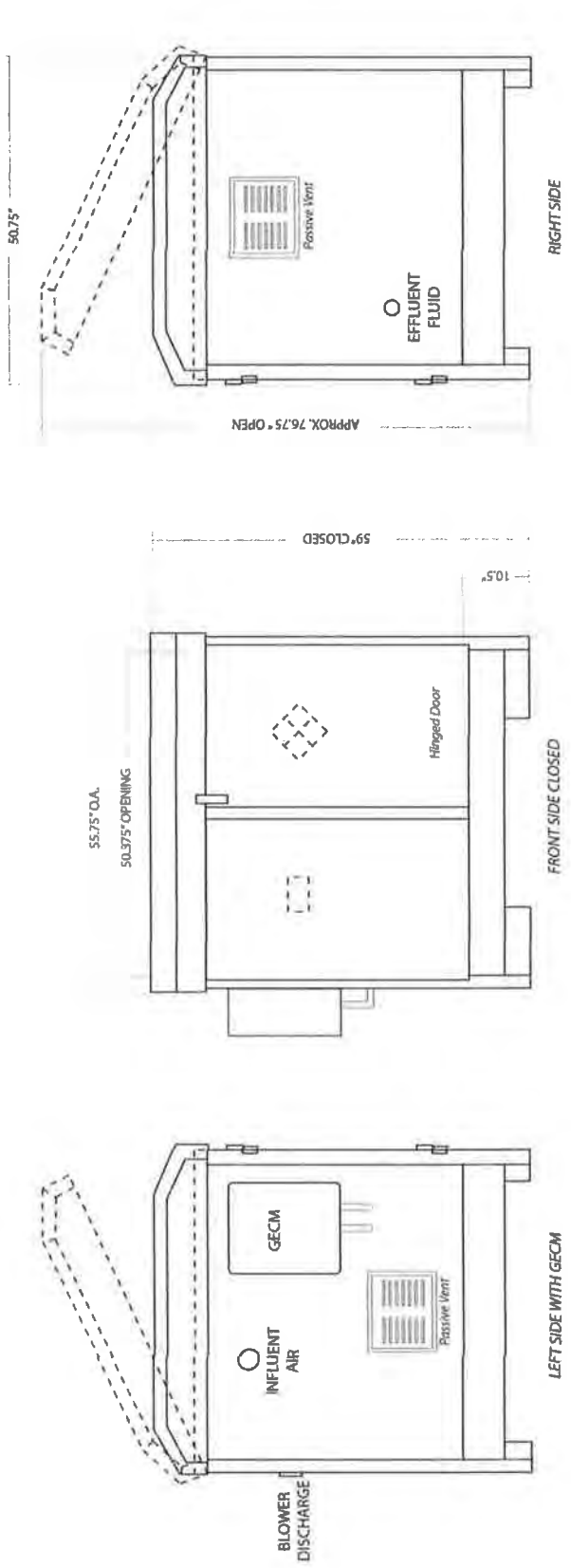
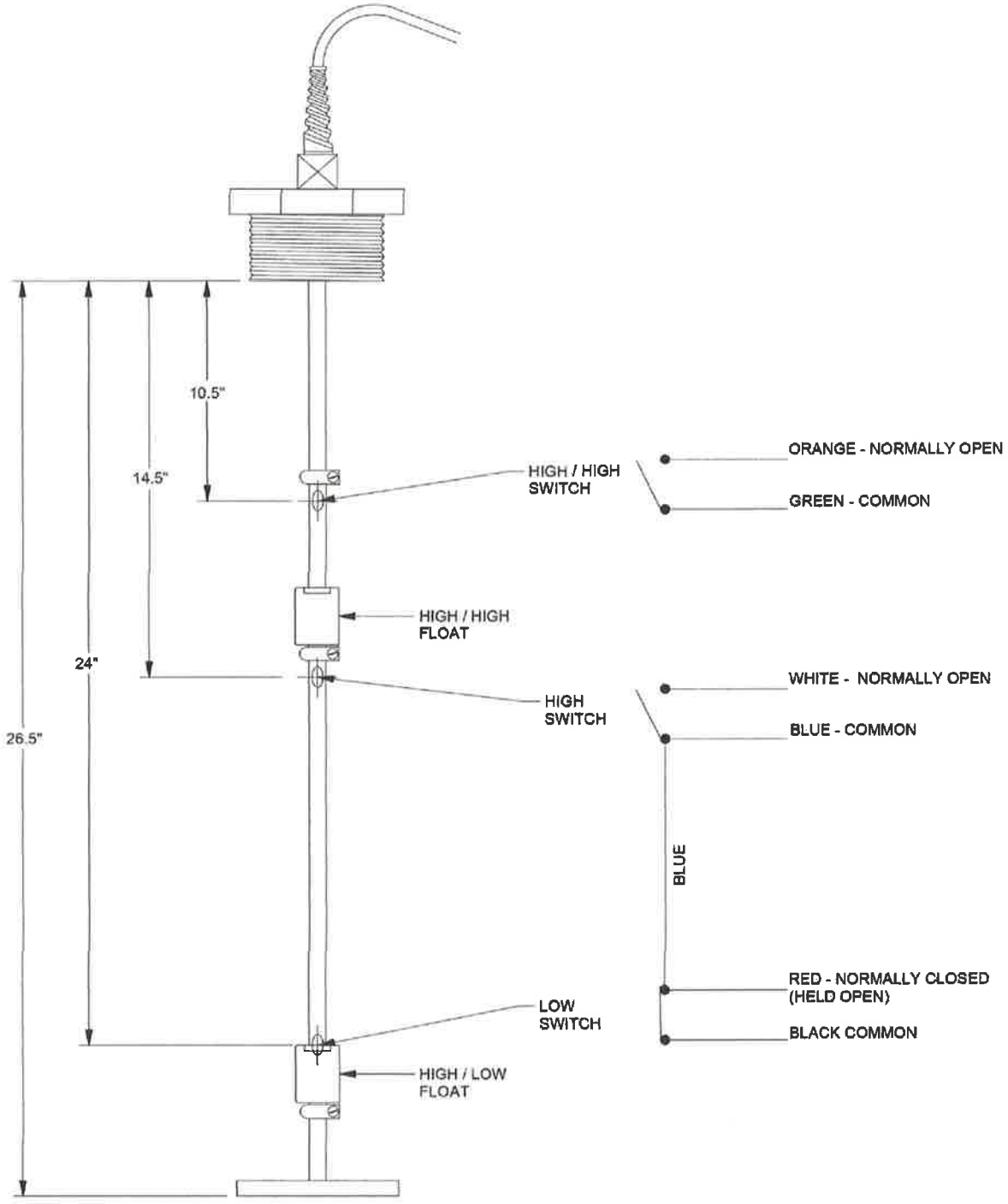


Figure 6-4, System Layout, Enclosure Elevations



Is this in KOP?

Figure 6-5, 3-Position Level Control Probe for Site Tube

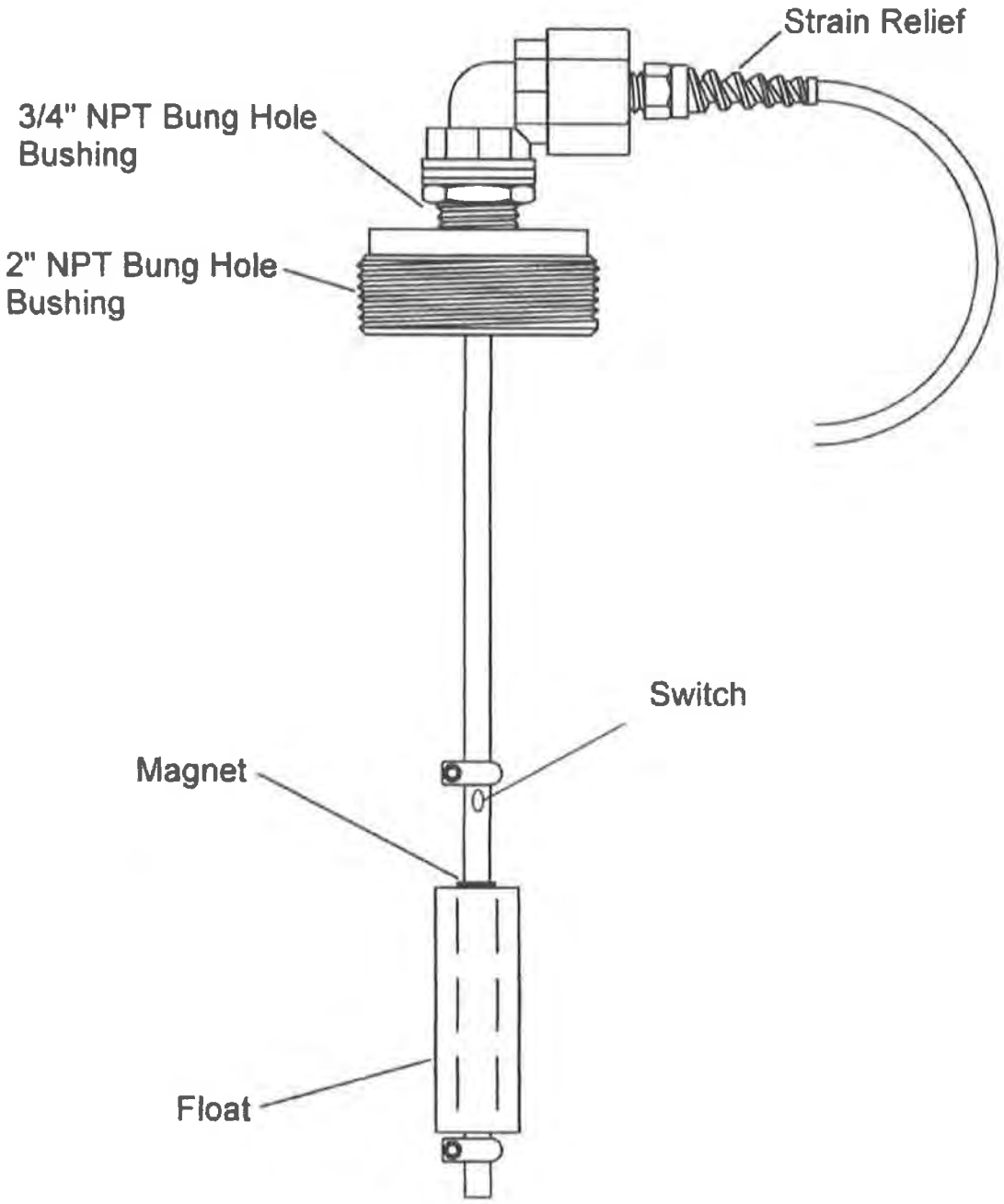


Figure 6-6, Basic Tankfull Probe

Appendix A - Glossary of Acronyms

BLWR	Blower
ECM	Electronic Control Module
GECM	Geotech Environmental Control Module
HI	High
HOA	Hand-Off-Auto (switch)
HP	Horse Power
IS	Intrinsically Safe
LCD	Liquid Crystal Display
LH	HI/LO float high (3 position probe)
LL	HI/LO float low (3 position probe)
LM	HI/LO float middle (3 position probe)
LO	Low
PCB	Printed Circuit Board
PH	Phase (electrical term)
PH	Product float high (SDFS/PSCAV probe)
PL	Product float low (SDFS/PSCAV probe)
PM	Product float middle (SDFS/PSCAV probe)
PSI	Pressure per Square Inch
SN	Serial Number
SVE	Soil Vapor Extractor (Extraction)
VAC	Voltage Alternating Current
VDC	Voltage Direct Current
XFER	Transfer Pump

The Warranty

For a period of one (1) year from date of first sale, product is warranted to be free from defects in materials and workmanship. Geotech agrees to repair or replace, at Geotech' s option, the portion proving defective, or at our option to refund the purchase price thereof. Geotech will have no warranty obligation if the product is subjected to abnormal operating conditions, accident, abuse, misuse, unauthorized modification, alteration, repair, or replacement of wear parts. User assumes all other risk, if any, including the risk of injury, loss, or damage, direct or consequential, arising out of the use, misuse, or inability to use this product. User agrees to use, maintain and install product in accordance with recommendations and instructions. User is responsible for transportation charges connected to the repair or replacement of product under this warranty.

Equipment Return Policy

A Return Material Authorization number (RMA #) is required prior to return of any equipment to our facilities, please call 800 number for appropriate location. An RMA # will be issued upon receipt of your request to return equipment, which should include reasons for the return. Your return shipment to us must have this RMA # clearly marked on the outside of the package. Proof of date of purchase is required for processing of all warranty requests.

This policy applies to both equipment sales and repair orders.

FOR A RETURN MATERIAL AUTHORIZATION, PLEASE CALL OUR SERVICE DEPARTMENT AT 1-800-833-7958.

Model Number: _____

Serial Number: _____

Date of Purchase: _____

Equipment Decontamination

Prior to return, all equipment must be thoroughly cleaned and decontaminated. Please make note on RMA form, the use of equipment, contaminants equipment was exposed to, and decontamination solutions/methods used.

Geotech reserves the right to refuse any equipment not properly decontaminated. Geotech may also choose to decontaminate equipment for a fee, which will be applied to the repair order invoice.

Geotech Environmental Equipment, Inc.
2650 East 40th Avenue Denver, Colorado 80205
(303) 320-4764 • **(800) 833-7958** • FAX (303) 322-7242
email: sales@geotechenv.com website: www.geotechenv.com

EN 858 & CP 858
Sealed Regenerative Blower w/Explosion-Proof Motor

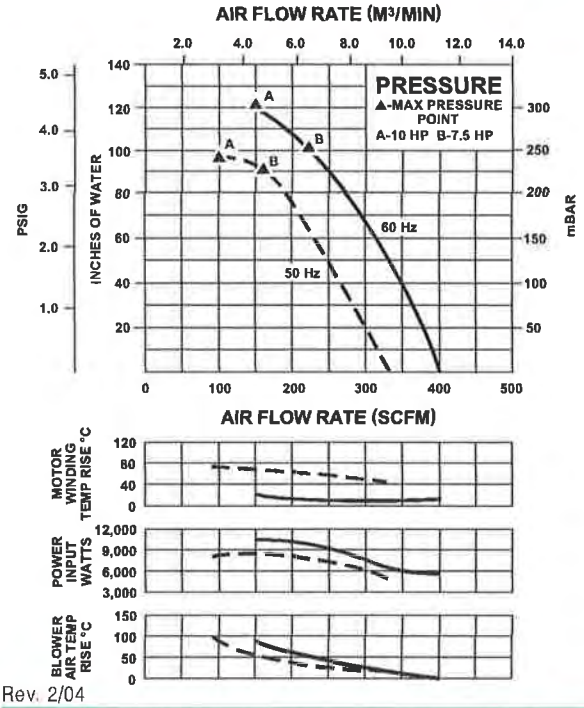
FEATURES
- Manufactured in the USA – ISO 9001 compliant
- Maximum flow: 400 SCFM
- Maximum pressure: 120 IWG
- Maximum vacuum: 98 IWG
- Standard motor: 10 HP, explosion-proof
- Cast aluminum blower housing, cover, impeller & manifold; cast iron flanges (threaded); teflon lip seal
- UL & CSA approved motor with permanently sealed ball bearings for explosive gas atmospheres Class I Group D minimum
- Sealed blower assembly
- Quiet operation within OSHA standards

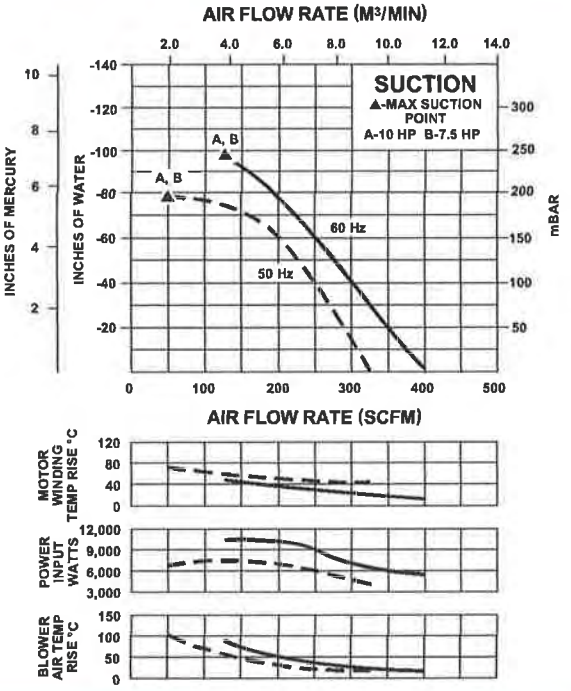
MOTOR OPTIONS
- International voltage & frequency (Hz)
- Chemical duty, high efficiency, inverter duty or industry-specific designs
- Various horsepowers for application-specific needs

BLOWER OPTIONS
- Corrosion resistant surface treatments & sealing options
- Remote drive (motorless) models
- Slip-on or face flanges for application-specific needs

ACCESSORIES (See Catalog Accessory Section)
- Flowmeters reading in SCFM
- Filters & moisture separators
- Pressure gauges, vacuum gauges & relief valves
- Switches – air flow, pressure, vacuum or temperature
- External mufflers for additional silencing
- Air knives (used on blow-off applications)
- Variable frequency drive package

BLOWER PERFORMANCE AT STANDARD CONDITIONS



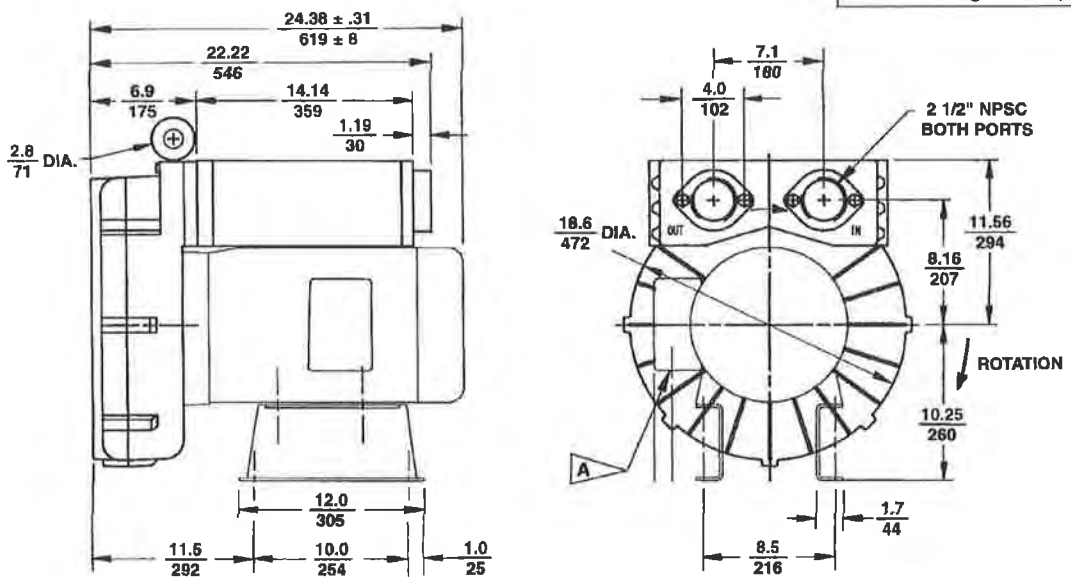


Rev. 2/04

AMETEK Technical and Industrial Products, Kent, OH 44240 • e mail: rotronindustrial@ametek.com • internet: www.ametektmd.com

EN 858 & CP 858
Sealed Regenerative Blower w/Explosion-Proof Motor

Scale CAD drawing available upon request.



DIMENSIONS: IN / MM
TOLERANCES: .XX ± .1 / 2.5
(UNLESS OTHERWISE NOTED)

A 0.75" NPT CONDUIT CONNECTION AT 12 O'CLOCK POSITION

SPECIFICATIONS

MODEL	EN858BD72WL		EN858BD86WL	EN858BA72WL		CP858FZ72WLR
Part No.	038744		038745	080070		038980
Motor Enclosure – Shaft Material	Explosion-proof – **CS**		Explosion-proof – **CS**	Explosion-proof – **CS**		Chem XP – **SS**
Horsepower	10.0		10.0	7.5		Same as EN858BD72WL – 038744 except add Chemical Processing (CP) features from catalog inside front cover
Phase – Frequency [1]	Three - 60 Hz		Three - 60 Hz	Three - 60 Hz		
Voltage [1]	230	460	575	230	460	
Motor Nameplate Amps	24	12	9.6	17	8.5	
Max. Blower Amps [3]	24	12	11.6	26	13	
Inrush Amps	162	81	93	126	63	
Starter Size	2	1	1	1	1	
Service Factor	1.0		1.0	1.0		
Thermal Protection [2]	Class B - Pilot Duty		Class B - Pilot Duty	Class B - Pilot Duty		
XP Motor Class – Group	I-D, II-F&G		I-D, II-F&G	I-D, II-F&G		
Shipping Weight	332 lb (151 kg)		332 lb (151 kg)	320 lb (145 kg)		

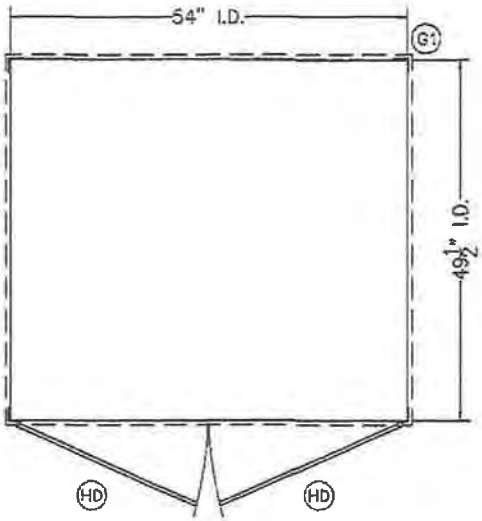
[1] Rotron motors are designed to handle a broad range of world voltages and power supply variations. Our dual voltage 3 phase motors are factory tested and certified to operate on both: **208-230/415-460 VAC-3 ph-60 Hz** and **190-208/380-415 VAC-3 ph-50 Hz**. Our dual voltage 1 phase motors are factory tested and certified to operate on both: **104-115/208-230 VAC-1 ph-60 Hz** and **100-110/200-220 VAC-1 ph-50 Hz**. All voltages above can handle a ±10% voltage fluctuation. Special wound motors can be ordered for voltages outside our certified range.

[2] Maximum operating temperature: Motor winding temperature (winding rise plus ambient) should not exceed 140°C for Class F rated motors or 120°C for Class B rated motors. Blower outlet air temperature should not exceed 140°C (air temperature rise plus inlet temperature). Performance curve maximum pressure and suction points are based on a 40°C inlet and ambient temperature. Consult factory for inlet or ambient temperatures above 40°C.

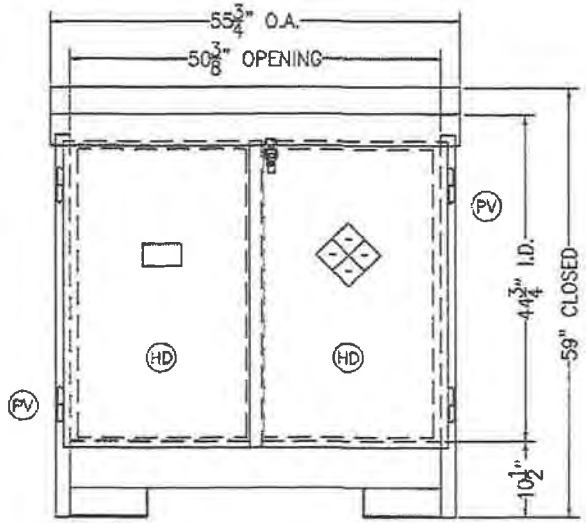
[3] Maximum blower amps corresponds to the performance point at which the motor or blower temperature rise with a 40°C inlet and/or ambient temperature reaches the maximum operating temperature.

Specifications subject to change without notice. Please consult your Local Field Sales Engineer for specification updates.

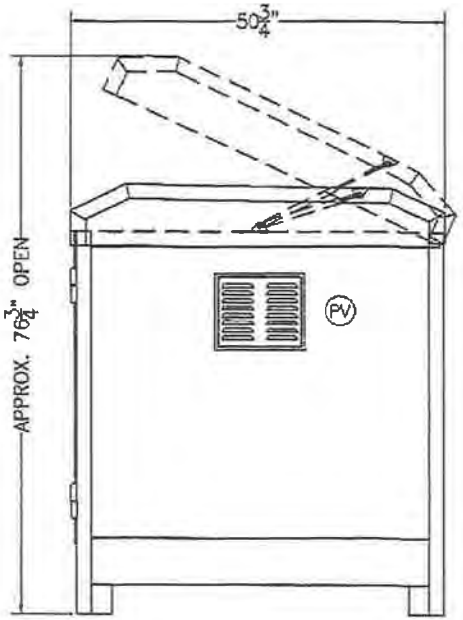
Rev. 2/04



PLAN VIEW



FRONT VIEW



RIGHT SIDE VIEW

GENERAL SPECIFICATIONS:

STORAGE CAPACITY:	4 EA. 55-GAL DRUMS
UNIT EST. WEIGHT:	600
CONSTRUCTION:	NON-COMBUSTIBLE
DOORS:	HINGED DOORS
SUMP VOLUME:	66 GAL.

11GA. CARBON STEEL SUMP
16GA. GALVNLD SKINS, DOOR, LID
ANGLE IRON FRAME

LEGEND

G1-EXTERIOR GROUNDING LUG
HD-HINGED DOOR
PV-PASSIVE VENT

MODEL:	K17-3503	CUSTOMER:			
DESCR.:	ENCLOSED HAZMAT STATION	DRAWN BY:	KMH	DATE:	05/27/04
DWG NUMBER:	K17-3503-S	REVISION:	00	ORDER NO.:	
SHEET:	1 OF 1				

APPROVAL SIGNATURE

DATE:

DENIOS
*Compliant Storage Systems for Hazardous Material

BORG GENERAL CONTROLS
1386 Jarvis Avenue
Elk Grove Village, IL 60007

800/338-1260
847/640-4635
F: 847/640-7934

OPERATING INSTRUCTIONS

PROGRAMMABLE INDUSTRIAL TIME SWITCHES

MODELS TA4150 THRU TA4153

FORM 5S2826
03475
0591/188/10M

READ CAREFULLY BEFORE ATTEMPTING TO ASSEMBLE, INSTALL, OPERATE OR MAINTAIN THE PRODUCT DESCRIBED. PROTECT YOURSELF AND OTHERS BY OBSERVING ALL SAFETY INFORMATION. FAILURE TO COMPLY WITH INSTRUCTIONS COULD RESULT IN PERSONAL INJURY AND/OR PROPERTY DAMAGE!
RETAIN INSTRUCTIONS FOR FUTURE REFERENCE.

Description

Borg programmable industrial time switches are for applications where it is required that electric circuits be switched on/off in periodically occurring cycles, e.g., electrical appliances, heating and ventilation systems, furnaces, annealing and drying ovens, automatic feeding machines, testing apparatus, laboratory equipment, protection and alarm systems.

Models are available with weekly or daily programs. Available with or without a rechargeable battery time reserve.

⚠ WARNING ⚠

DO NOT USE THIS TIME SWITCH IN AN EXPLOSIVE ATMOSPHERE!

ADDITIONAL TIME SWITCH FEATURES

- Models with battery time reserve driven by quartz controlled step motor.
- Program disc with non-detachable switch actuators.
- Easy and fast program setting.
- Display of switch-on time period by orange time section.
- Daily models have 96 switch actuators which give switching intervals of 15 minutes.
- Weekly models have 84 switch actuators which give switching intervals of 2 hours.
- Time reserve models have approximately a 90 hour reserve.
- The ambient temperature range for the time reserve models is -10°C to +55°C.
- The ambient temperature range for the standard models is -10°C to +85°C.

Specifications & Dimensions

MODEL	PROGRAM	SWITCH	TIME RESERVE	MOTOR INPUT	CONTACT RATINGS @ 120AC		
					HP	TUNG-STEN WATTS	PILOT DUTY VA
TA4150	Daily	SPST	No	120vac	1/2	1000	470
TA4152	Daily	SPST	Yes	120vac	1/2	1000	470
TA4151	Weekly	SPST	No	120vac	1/2	1000	470
TA4153	Weekly	SPST	Yes	120vac	1/2	1000	470

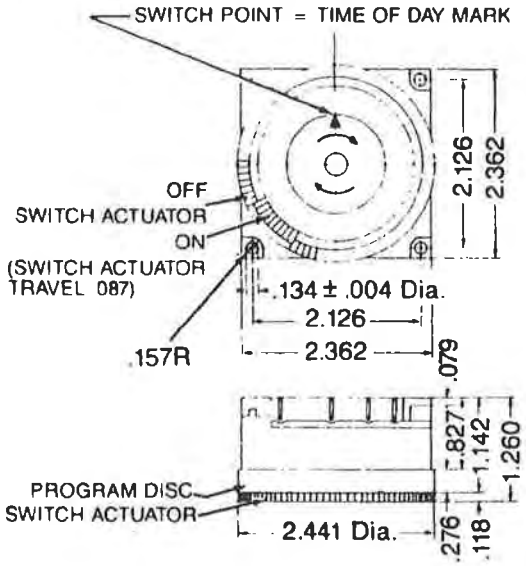


Figure 1 — Dimensions

General Safety Information

⚠ WARNING ⚠

DO NOT USE THIS TIME SWITCH IN AN EXPLOSIVE ATMOSPHERES!

1. These devices should be used within their recognized ratings as shown on device.
2. These devices shall be mounted in a suitable enclosure complying with the requirements of the National Electrical Code and all local codes and ordinances.
3. The connections to the device are intended to be accomplished with the use of the proper quick disconnect terminals.
4. Wire should have a temperature rating of 105C minimum.
5. The suitability of the dial as part of the enclosure, should be determined in the application.
6. The overall temperature of the device shall not exceed 85°C (55°C for time reserve models).
7. Clock operated time switches have a finite life. Normal failure modes include contact sticking and improper operation. Installation where property damage, and/or personal injury might result due to a possibility of improper operation, requires the further installation of backup systems designed to prevent personal injury and/or property damage.

Installation

1. Crimp 1/4" quick disconnect terminals (not furnished) to wires.

   NOTE: All wiring should be done in accordance with the National Electrical Code and all local requirements.

2. Align template on mounting plate (not furnished) and center punch the center of the dial clearance hole and the centers of the three mounting holes. (See Figure 2)

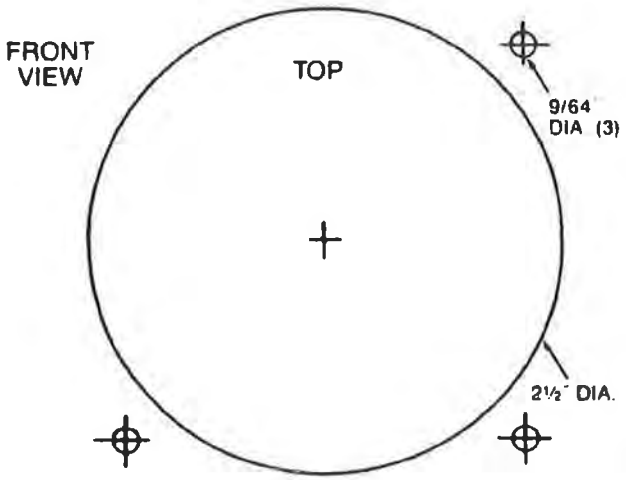


Figure 2 — Template (Actual Size)

3. Drill the three mounting holes 9/64" diameter. Punch out the center dial clearance hole 2½" diameter (standard conduit punch may be used).
4. Mounting the unit onto the mounting plate, as shown, using the enclosed hardware. (See Figure 3).

⚠ CAUTION

The spacers must be used between the timer and the mounting plate to prevent the timer housing from cracking.

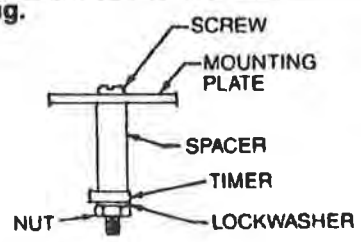


Figure 3 — Mounting Detail

5. Connect the previously prepared wires to the unit.

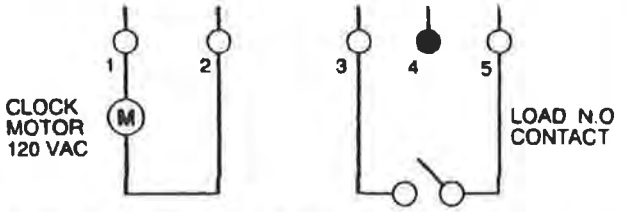


Figure 4 — Wiring Diagrams

6. Install the assembled timer and mounting plate into an NEMA approved enclosure, following all local electrical and safety codes, as well as the National Electrical Code (NEC) and the Occupational Safety and Health Act (OSHA).

Operation

1. Rotate the program disc, in the direction of the arrows, to align the correct time of day (the correct day of the week for weekly models) with the time of day mark.
2. Set the desired switching program by pushing the switch actuators toward the center of the time switch. Each actuator provides a 15 minute on time (2 hour on time for weekly models). The now visible orange area(s) indicate the switch on period.

IMPORTANT: MODELS WITH BATTERY RESERVE

These models utilize a nickel cadmium battery to provide power during power outages. This battery has a normal operating life of 6 to 8 years and it is not user replaceable.

For maximum battery life the unit should not be disconnected from the power source and stored for long periods of time (over two weeks) in a discharged condition. The maximum battery life is realized by maintaining a constant float charge in normal service operation. Normal power interruptions or disconnections of less than five days are considered to be normal service.

Troubleshooting Chart

SYMPTOM	POSSIBLE CAUSES	CORRECTIVE ACTION
Time switch does not run	Proper power not reaching unit	Check that time switch is connected to a live power line with good fuses, and that the voltage at the terminals is correct

LIMITED WARRANTY

Diehl ONE-YEAR LIMITED WARRANTY. Programmable industrial time switches. Models TA4150 Thru TA4153 are warranted by Diehl to the original user against defects in workmanship or materials under normal use for one year after date of purchase. Any part which is determined by Diehl to be defective in material or workmanship and returned to an authorized service location, as Diehl designates, shipping costs prepaid, will be, as the exclusive remedy, repaired or replaced at Diehl's option. For limited warranty claim procedures, see PROMPT DISPOSITION below. This limited warranty gives purchasers specific legal rights which vary from state to state.

LIMITATIONS OF LIABILITY. To the extent allowable under applicable law, Diehl's liability for consequential and incidental damages is expressly disclaimed. Diehl's liability in all events is limited to, and shall not exceed, the purchase price paid.

WARRANTY DISCLAIMER. Diehl has made a diligent effort to illustrate and describe the products in this literature accurately, however, such illustrations and descriptions are for the sole purpose of identification, and do not express or imply a warranty that the products are merchantable, or fit or fit for a particular purpose, or that the products will be necessarily conform to the illustrations or descriptions.

Except as provided below, no warranty or affirmation of fact, expressed or implied, other than as stated in "LIMITED WARRANTY" above is made or authorized by Diehl.

PRODUCT SUITABILITY. Many states and localities have codes and regulations governing sales, construction, installation, and/or use of products for certain purposes, which vary from those in neighboring areas. While Diehl attempts to assure that its products comply with such codes, it cannot guarantee compliance, and cannot be responsible for how the product is installed or used. Before purchase and use of a product, please review the product application, and national and local codes and regulations, and be sure that the product, installation, and use will comply with them.

Certain aspects of disclaimers are not applicable to consumer products; e.g., (a) some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you; (b) also, some states do not allow limitations on how long an implied warranty lasts, consequently the above limitation may not apply to you; and (c) by law, the period of this limited warranty, any implied warranties of merchantability or fitness for a particular purpose applicable to consumer products purchased by consumers, may not be excluded or otherwise disclaimed.

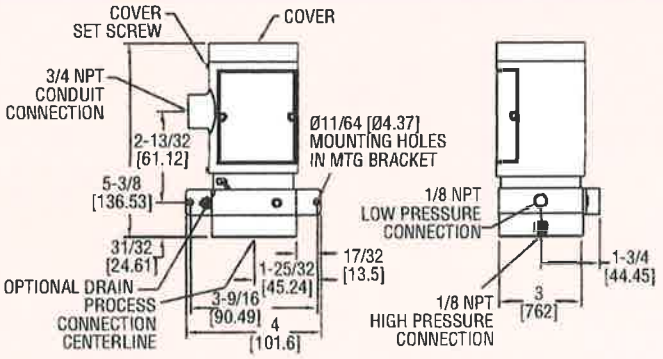
PROMPT DISPOSITION. Diehl will make a good faith effort for prompt correction or other adjustment with respect to any product which proves to be defective within limited warranty. For any product believed to be defective within limited warranty, first write or call dealer from whom product was purchased. Dealer will give additional directions. If unable to resolve satisfactorily, write to Diehl, giving dealer's name, address, date and number of dealer's invoice, and describing the nature of the defect. Title and risk of loss pass to buyer on delivery to common carrier. If product was damaged in transit to you, file a claim with carrier.

BORG GENERAL CONTROLS, LLC
1386 JARVIS AVE., ELK GROVE VILLAGE, IL 60007

Series H3

Explosion-Proof Differential Pressure Switches

Setpoints from 10 in w.c. to 200 psid — Rated 1500 psig, Weatherproof



Explosion-proof, heavy duty, industrial unit has a unique new design which provides sensitivity to differential pressures as low as 10 inches of water (254 mm w.c.), yet handles total pressure of 1500 psi (103 bar). Unlike common differential pressure switches that use a piston-type motion transfer, the Series H3 utilizes a rotary motion transfer shaft that prevents a change in total pressure from causing a setpoint shift. Unit yields deadbands approximately 5% of range, with zero setpoint shift due to variation in working pressures. Friction is minimized and repeatability increased by allowing range spring to act directly on diaphragm plate. Rolling diaphragm design maintains constant effective area to further reduce friction. Diaphragm is allowed to "seat", allowing application of full rated pressure, *up to 1500 psi (103 bar), on either high or low pressure port, without damage.* Special overtravel feature prevents overtightening of range adjust screw. Choose optional 316SS chamber for water and water-based fluids or harsher applications.

SPECIFICATIONS

Wetted Materials: See pressure chamber and diaphragm material in model chart.
Temperature Limit: -4 to 220°F (-20 to 104°C), ATEX: -20 to 90°C (-4 to 194°F).
Pressure Limit: 1500 psig (103 bar).
Enclosure Rating: Standard meets NEMA 4X (IP56), drain option meets NEMA 3 (IP54). For hazardous use see the hazardous location ratings chart.
Switch Type: SPDT or DPDT snap switch.
Electrical Rating: 5A @ 125/250 VAC, 30 VDC.
Electrical Connections: See model chart.
Conduit Connection: 3/4" female NPT.
Process Connection: 1/8" female NPT.
Mounting Orientation: Vertical.
Set Point Adjustment: Internal screw.
Weight: 4 lb, 2 oz (2 kg).
Deadband: Approximately 5% of range.
Agency Approvals: ATEX, CE, CSA, UL see ratings chart.

Hazardous Location Ratings

Model	UL	CSA	Directive 94/9/EC ATEX Compliant
H3 _ – _ _ C	—	—	CE 0344 Ex II 2 G EEx d IIB -20°C≤ T amb ≤ 75°C T6 EC-Type Certificate No. KEMA 03ATEX 2584
H3 _ – _ _ L H3 _ – _ _ T	Cl. I, Gr.B, C & D Cl. II, Gr.E, F & G	Cl. I, Gr.B, C & D Cl. II, Gr.E, F & G	—
H3 _ – _ _ C-DRAIN	—	—	CE 0344 Ex II 2 G EEx d IIB -20°C≤ T amb ≤ 75°C T6 EC-Type Certificate No. KEMA 03ATEX 2584
H3 _ – _ _ L-DRAIN	Cl. I, Gr.B, C & D Cl. II, Gr.E, F & G	—	—

Note: Shown without enclosure and cover.

Internal terminal blocks for conductors up to 18 gauge are optional.

Optional NEMA 3 (IP 54) enclosure includes explosion-proof drain. Standard NEMA 4X (IP 56) version is without drain.

External Ground Connection Standard — Internal ground connection also standard — use either one.

Example	H3	S	2	S	C	MV	H3S-2SC-MV Differential Pressure Control; 316 SS pressure chamber and *Fluoroelastomer diaphragm*; weatherproof and ATEX; SPDT snap action switch with gold contacts; fixed deadband, automatic reset; adjustable range 0.5-15 psid
Construction	H3						Series designator, weatherproof and explosion-proof
Pressure Chamber & Diaphragm Material (Wetted)		A S					Aluminum chamber with Nitrile diaphragm 316 SS chamber with Fluoroelastomer diaphragm
Adjustable Operating Range			1 2 3 4				Adjustable range 10-180 in. w.c. (2.48-44.78 kPa) Adjustable range 0.5-15 psid (0.03-1 bar) Adjustable range 5-70 psid (.34-4.8 bar) Adjustable range 10-200 psid (.7-13.8 bar)
Circuit (Switch) Options				S D			*SPDT snap action switch rated 5A @ 125/250* VAC, 30 VDC DPDT snap action switch rated 5A @ 125/250 VAC, 30 VDC
Electrical Connection Options					L T C		18 AWG x 18 inch lead wires UL, CSA approved internal terminal block ATEX approved internal terminal block
						DRAIN MV VIT	Enclosure with drain - allows condensate to be drained from inside (meets NEMA 3 instead of 4X) Gold contacts on snap switch for dry circuits rated 1A @ 125 VAC, 1A resistive or 0.5 A inductive @ 30 VDC Fluoroelastomer diaphragm option where not standard

SENSAPHONE®

REMOTE MONITORING SOLUTIONS

Sensaphone 400 & 800

Technical Specifications

INPUT ZONES

Number of Zones: 400 - 4, 800 - 8

Zone Connector: terminal block

Zone Types:

N.O./N.C. contact,
2.8K Thermistor -20° to 150°F | -30° to 65°C

Zone Characteristics: 5.11K to 2.85V (Short circuit current: 1mA max.)

A/D Converter Resolution: 10 bits ±2 LSB

Zone Protection: 5.5VDC Metal Oxide Varistor with fast acting diode clamps.

RELAY OUTPUT

Rated for 1A 30VAC/1A 30VDC maximum.

LED INDICATORS

System On, Phone In Use, Alarm, Battery Ok.

MICROPHONE

Internal Electret Condenser: For listening in to on-site sounds and detecting high sound levels.

PHONE INTERFACE

Line RJ11 Jack: For connection to a two-wire analog telephone line. (6' modular cord included)

Extension RJ11 Jack w/ Line Seizure: For connecting other devices on the same telephone line, devices connected to this jack are disconnected in the event that the 400 must dial out for an alarm.

Phone Line Protection: Metal Oxide Varistor & self-resetting fuse

POWER SUPPLY

Power Supply: 120VAC/9VDC 60Hz 6W wall plug-in transformer w/6' cord.

Power Consumption: 1.5 Watts

Power Protection: Metal Oxide Varistor

Battery Backup: Six size-C alkaline batteries (not included), providing up to 24 hours of back-up time.

ENVIRONMENTAL

Operating Temperature:
32° to 122°F | 0° to 50°C

Operating Humidity:
0–90% RH non-condensing

Storage Temperature:
32° to 140°F | 0° to 60°C

PHYSICAL

Dimensions: 2.1 x 7.8 x 8.8"d | 5 x 20 x 22mm

Weight: 8 lbs. | 3.6kg

Enclosure: Indoor rated ABS Plastic & Polycarbonate w/clear window door

901 Tryens Road • Aston, PA 19014 • PH: 877-373-2700 • F: 610-558-0222 • www.sensaphone.com

No. 6X546

No. 1XC25

INTERMATIC

Spring-Wound Mechanical Timers

- 20A inductive/7A tungsten 1 HP at 125V, 10A 2 HP at 250V, 10A at 277V

Models with Hold feature have option for continuous On. Timing mechanism has all-metal gears. Timers mount in min. 2" x 4" single-gang outlet box. Ivory and white timers require standard toggle or decorator style wall plates; see page 611. All are UL Listed and CSA Certified.

	SILVER WALL PLATE W/WHITE KNOB								IVORY (WALL PLATE REQUIRED)								WHITE (WALL PLATE REQUIRED)							
	SPST				SPDT		DPST		SPST				SPDT		DPST		SPST				SPDT		DPST	
	Without Hold		With Hold		Without Hold		With Hold		Without Hold		With Hold		Without Hold		Without Hold		Without Hold		With Hold		Without Hold		Without Hold	
Max. Time	Item No.	$ Each	Item No.	$ Each	Item No.	$ Each	Item No.	$ Each	Item No.	$ Each	Item No.	$ Each	Item No.	$ Each	Item No.	$ Each	Item No.	$ Each	Item No.	$ Each	Item No.	$ Each	Item No.	$ Each
5 min.	6X545	29.30	4A217	33.10	—	—	—	—	4WZ17	36.10	—	—	—	—	—	—	38D055	26.80	—	—	—	—	—	—
15 min.	2E269	25.25	3FXA3	26.10	3FXA4	63.30	—	—	3FXA5	88.25	1XC25	31.90	—	—	—	—	3FXC9	88.25	38D056	25.30	38D057	25.30	—	—	—	—
30 min.	2E175	25.20	3FXA6	43.35	3FXA7	63.30	—	—	3FXA8	88.25	1XC26	27.85	—	—	—	—	4WZ15	72.95	38D058	25.30	38D059	26.80	—	—	38D071	90.95
60 min.	6X546	26.50	2E270	26.20	3FXA9	63.30	—	—	3FXC1	85.30	1XC27	31.95	4WZ18	34.40	4WZ14	54.00	4WZ16	70.70	38D060	25.30	38D061	26.80	—	—	38D072	49.40
2 hr.	3FXC2	47.85	—	—	3FXC3	77.15	—	—	—	—	—	—	—	—	4WZ13	58.65	—	—	38D062	52.45	—	—	38D068	55.45	—	—
4 hr.	3FXC4	47.85	—	—	3FXC5	74.60	—	—	—	—	—	—	—	—	—	—	—	—	38D063	52.45	—	—	38D069	71.90	—	—
6 hr.	4A218	35.50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	38D064	52.45	38D065	54.35	—	—	38D073	80.35
12 hr.	2E052	25.25	6X547	34.45	3FXC6	77.15	3FXC7	77.15	3FXC8	85.30	—	—	—	—	—	—	—	—	38D066	52.45	38D067	54.35	—	—	—	—

24-Hr. Module
No. 2A517

24-Hr. and 7-Day Electromechanical Modules

DIEHL

Reliable modules for panel-mount installations. 24-hr. timers have up to 48 On/Off settings per day; 7-day timers have 42 On/Off settings per week, 6 settings per day. 2½"-dia. dial opening required to mount module through panel. UL Recognized and CSA Certified.

No. of Poles	Contact Form	Voltage	Amps	Contact HP @ 120V	Min. Time Setting	Max. Time Setting	L (in.)	W (in.)	D (in.)	Mfr. Model	Item No.		$ Each
Synchronous Motors													
1	SPST-NO	120	20/15	½	15 min.	23½ hr.	2⅜	2⅜	1¼	TA-4150	2A517	✓	59.05
1	SPST-NO	120	20/15	½	2 hr.	6 days, 20 hr.	2⅜	2⅜	1¼	TA-4151	2A518	✓	61.40
Quartz Motors with 150 Hr. NiCd Battery Backup													
1	SPST-NO	120	20/15	½	15 min.	23½ hr.	2⅜	2⅜	1¼	TA-4152	2A519	✓	140.50
1	SPST	120	20/15	½	2 hr.	6 days, 20 hr.	2⅜	2⅜	1¼	TA-4153	2A520	✓	131.95

No. 6PY50

No. 4WX97

DIEHL

Digital Interval Countdown Timer

- SPST contact configuration
- Input voltage: 120VAC
- Contact load rating: 15A at 120V

Dependable timer for use with medical equipment, commercial cooking appliances, pools and spas, and exercise equipment. Includes repeat memory, interlock connection, large easy-to-read display, and optional time-of-day display. Timing range: 0 to 99 hr., 59 min.; 1-sec. time intervals from 0 to 99 sec. and 0 to 99 min.; 1-min. intervals from 0 to 99 hr., 59 min. UL Listed, CSA and CE Certified.

Description	Mfr. Model	Item No.		$ Each
Timer	TA4180A	6PY50	✓	154.75
Face Plate	49150-00	4WX97		11.61

No. 4VMG2

No. 4VMG3

Time Switches

Spring-wound, Auto-Off. UL Listed.

70 SERIES

- 20A through-panel mount wall switch
- Satin aluminum dial

Mechanical devices handle exceptionally high heat. Splashproof construction.

MarkTime
Brand of Energy Saving Products

70AB SERIES

- 28A mechanical time switch
- Brushed aluminum

Heavy-duty wall box handles high current loads. Highest amperage rating of any wall-box time switch. Double gang wall-box installation. Wall plate and knob included.

	Item No.		$ Each
70 Series			
	4VMG2	✓	121.60
	4VMG1	✓	121.35
70AB Series			
	4VMG6	✓	189.50
	4VMG7	✓	192.25
	4VMG8	✓	193.00
	4VMG3	✓	132.90
	4VMG9	✓	192.25
	4VMH1	✓	193.00
	4VMG4	✓	189.75
	4VMG5	✓	192.25

No. 4CCA4

No. 4CCA3

Timer Modules

INTERMATIC

- ½ HP, 120VAC
- 12A ballast, 120VAC
- 16A, 277VAC resistive
- Min. time setting: 1 min.
- Max. time setting: 6 days, 23 hr., 59 min.

Provide 24-hr. or 7-day scheduling on any electrical load with HVACR equipment. Also for use in lighting, security, circulating pump, and spa applications.

No. of Channels	Max. On/Off Cycles	L (in.)	W (in.)	D (in.)	Mfr. Model	24VAC Item No.	12VAC/DC Item No.	120VAC Item No.	240VAC Item No.	$ Each
Mechanism Only										
1	20	3	3	2	FM1D20	4CCA4	—	4CCA7	4CCC1	167.50
½	50	3	3	2	FM1D50	4CCC7	4CCC4	4CCD1	4CCD4	214.00
2	50	4.38	3.43	2.63	FM2D50	4CCD6	—	4CCD5	4CCD7	390.50
Flush Mount										
1	20	3.5	3.25	2.25	FM1D20E	4CCA2	—	4CCA5	4CCA8	183.50
1	50	3.5	3.25	2.25	FM1D50E	4CCC5	4CCC2	4CCC8	4CCD2	227.00
Surface/DIN Rail Mount										
1	20	4.75	3.25	3.25	FM1D20A	4CCA3	—	4CCA6	4CCA9	177.25
1	50	4.75	3.25	3.25	FM1D50A	4CCC6	4CCC3	4CCC9	4CCD3	231.50

No. 14H247

No. 14H248

No. 32J136

No. 14H252

Electronic Timers

- Battery backup protects memory
- Adjustable cycle mode
- 120-240VAC
- 15A at 250VAC (except No. 32J135 is 10A)

OMRON®

Autonics
Sensors & Controllers

Easy-to-use timers allow each circuit to be independently programmed. Manual override. UL Listed and CSA Certified.

No. of Channels	Contact Form	Max. On/Off Cycles	Min. Time Setting	Max. Time Setting	No. of Pulse Events	Pulse Duration	Operation Mode	Backup Time	Brand	PANEL MOUNT Item No.		$ Each	TRACK/SURFACE MOUNT Item No.		$ Each
2	(2) SPST-NO	12	1 min.	24 hr.	—	—	7 Days	10 yr.	Omron	14H247	*✓	411.75	—		—
1	SPST-NO	12	1 min.	7 Days	24	1 sec. to 60 min.	7 Days	5 yr.	Omron	14H253	✓	461.25	14H252	✓	443.50
2	(2) SPST-NO	20	1 min.	7 Days	40	1 sec. to 60 min.	7 Days	5 yr.	Omron	14H248	✓	398.50	14H249	✓	416.00
2	(2) SPST-NO	24	1 min.	365 Days	48	1 sec. to 60 min.	365 Days	5 yr.	Omron	14H250	✓	854.00	14H251	✓	854.00
2	(2) SPDT-NO	48/24	1 min.	7/365 Days	48	1 sec. to 60 min.	7/365 Days	5 yr.	Autonics	32J135	*✓	274.25	—		—
1	SPST-NO	48/24	1 min.	7/365 Days	24	1 sec. to 60 min.	7/365 Days	5 yr.	Autonics	32J136	*✓	223.50	—		—

Also track mountable.

TECHNICAL BROCHURE
BNPE

NPE

316L SS

NPE SERIES END SUCTION CENTRIFUGAL PUMPS
BOMBAS CENTRÍFUGAS DE SUCCIÓN FINAL SERIE NPE

GOULDS
WATER TECHNOLOGY
a xylem brand

A FULL RANGE OF PRODUCT FEATURES
UNA GAMA TOTAL DE CARACTERÍSTICAS DEL PRODUCTO

Superior Materials of Construction: Complete AISI 316L stainless steel liquid handling components and mounting bracket for corrosion resistance, quality appearance, and improved strength and ductility.

High Efficiency Impeller: Enclosed impeller with unique floating seal ring design maintains maximum efficiencies over the life of the pump without adjustment.

Casing and Adapter Features: Stainless steel construction with NPT threaded, centerline connections, easily accessible vent, prime and drain connections with stainless steel plugs. Optional seal face vent/flush available.

Mechanical Seal: Standard John Crane Type 21 with carbon versus silicon-carbide faces, Viton elastomers, and 316 stainless metal parts. Optional high temperature and chemical duty seals available.

Motors: NEMA standard open drip-proof, totally enclosed fan cooled or explosion proof enclosures. Rugged ball bearing design for continuous duty under all operating conditions.

The various versions of the NPE are identified by a product code number on the pump label. This number is also the catalog number for the pump. The meaning of each digit in the product code number is shown at left.

Materiales Superiores de Construcción: *Componentes completos para manejo de líquidos en acero inoxidable AISI 316L y consola para el montaje para resistencia a la corrosión, apariencia de calidad, y fuerza y ductilidad mejoradas.*

Impulsor de Eficiencia Superior: El impulsor encerrado con un diseño único de anillo del sello flotante, mantiene sin ajustes, la eficiencia máxima sobre la vida de la bomba.

Características de la Carcasa y del Adaptador: *Construcción en acero inoxidable con NPT roscado, conexiones centrales, válvulas de fácil acceso, conexiones de cebado y drenaje con enchufes de acero inoxidable. Cara del sello válvula/chorro opcional disponible.*

Sello Mecánico: *Estándar John Crane Tipo 21 con carbón en contraste con caras de silicón-carbide, elastómeros de Viton, y partes metálicas de acero inoxidable 316. Sellos de alta temperatura y productos químicos están disponibles.*

Motores: *Estándar NEMA a prueba de goteo, ventilador totalmente encerrado o recintos a prueba de explosión. Diseño robusto de balineras de bolas para trabajo continuo en todas las condiciones de funcionamiento.*

Las diferentes versiones de la NPE se identifican con un número de código del producto en la etiqueta de la bomba. Este número es también el número del catálogo para la bomba. El significado de cada dígito en el número de código del producto se muestra a la izquierda.

NPE PRODUCT LINE NUMBERING SYSTEM
LÍNEA DE PRODUCTO NPE SISTEMA DE NUMERACIÓN

Example Product Code,
Ejemplo Código del Producto

1 ST 2 C 1 A 4 F

Seal Vent/Flush Option,
Opción de Sello Válvula/ChorroSeal Ven

Mechanical Seal and O-ring
4 = Pre-engineered standard
For optional mechanical seal modify catalog order no. with seal code listed below.

Sello Mecánico y Anillo 'O'
4 = Estándar aprobado
Para sello mecánico opcional modificar el número de orden del catálogo con el código del sello anotado abajo.

John Crane Type 21 Mechanical Seal (⅝" seal), *Sello Mecánico John Crane Tipo 21 (sello de ⅝")*

Seal Code, *Código del Sello*	Rotary, *Rotativo*	Stationary, *Estacionario*	Elastomers, *Elastómeros*	Metal Parts, *Partes Metálicas*	Part No., *Pieza Número*
2	Carbon	Silicon Carbide	EPR	316 SS	10K18
4			Viton		10K55
5	Silicon Carbide		EPR		10K81
6			Viton		10K62

Impeller Option . . . No Adder Required
For optional impeller diameters modify catalog order no. with impeller code listed. Select optional impeller diameter from pump performance curve.

Código del Impulsor Opcional
Para impulsores con diámetros opcionales modificar el número de orden del catálogo con el código del impulsor anotado. Escoger el impul con diámetro opcional de la curva de funcionamiento de la bomba.

Impeller Code, *Código del Impulsor*	Pump Size, *Tamaño de la Bomba* 1 x 1¼ - 6 Diameter	1¼ x 1½ - 6 Diameter	1½ x 2 - 6 Diameter
K	-	6⅛	-
G	-	5 15/16	5⅞
H	-	5½	5
A	6⅛	5¼	4⅜
B	5¾	5 1/16	4⅝
C	5 3/16	4⅞	4⅜
D	4¾	4⅝	4 1/16
E	4 7/16	4¼	3⅝
F	4 1/16	3⅞	-

Driver, Conductor
1 = 1 PH, ODP
2 = 3 PH, ODP
3 = 575 V, ODP
4 = 1 PH, TEFC
5 = 3 PH, TEFC
6 = 575 V, TEFC
7 = 3 PH, XP
8 = 575 V, XP
9 = 3 PH, TEFC Premium Eff.
0 = 1 PH, XP

HP Rating, *HP Potencia*
C = ½ HP E = 1 HP G = 2 HP J = 5 HP
D = ¾ HP F = 1½ HP H = 3 HP

Driver: Hertz/Pole/RPM,
Conductor: Hercios/Polo/RPM
1 = 60 Hz, 2 pole, 3500 RPM
2 = 60 Hz, 4 pole, 1750 RPM
3 = 60 Hz, 6 pole, 1150 RPM
4 = 50 Hz, 2 pole, 2900 RPM
5 = 50 Hz, 4 pole, 1450 RPM

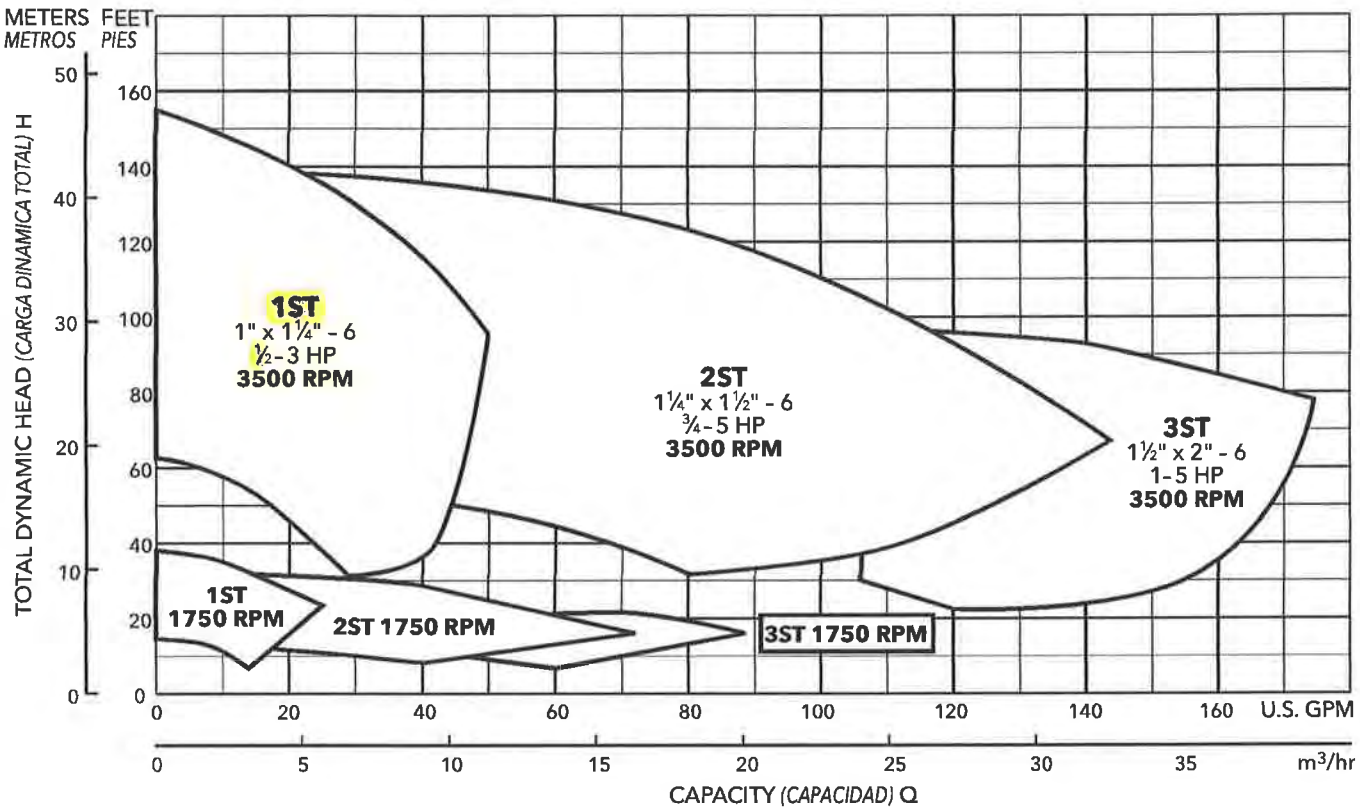
Material
ST = Stainless steel, *Acero inoxidable*

Pump Size, *Tamaño de la Bomba*
1 = 1 x 1¼ - 6 2 = 1¼ x 1½ - 6 3 = 1½ x 2 - 6

For frame mounted version, substitute the letters "FRM" in these positions.

Para la versión con el armazón montado, sustituya las letras "FRM" en estas posiciones.

PERFORMANCE COVERAGE (60 HZ)
ALCANCE DE FUNCIONAMIENTO (60 HZ)



NOTES:
Not recommended for operation beyond printed H-Q curve.

For critical application conditions consult factory.

Not all combinations of motor, impeller and seal options are available for every pump model. Please check with G&L on non-cataloged numbers.

All standard 3500 RPM ODP and TEFC motors supplied by Goulds Pumps, have minimum of 1.15 service factor. Standard catalog units may utilize available service factor. Any motors supplied other than Goulds Pumps check available service factor.

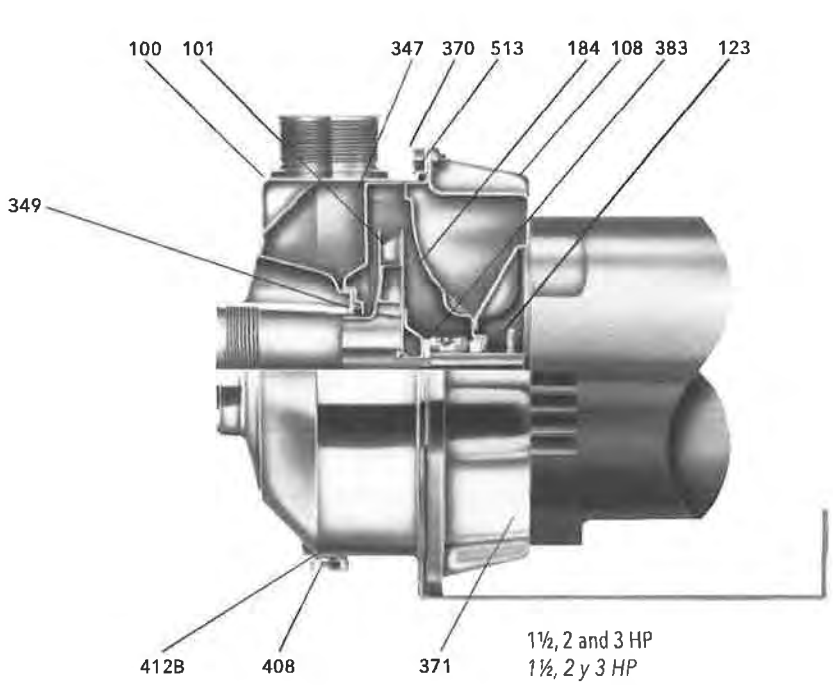
NOTAS:
No se recomienda para funcionamiento superior al impreso en la curva H-Q.

Para condiciones de aplicaciones críticas consultar con la fábrica.

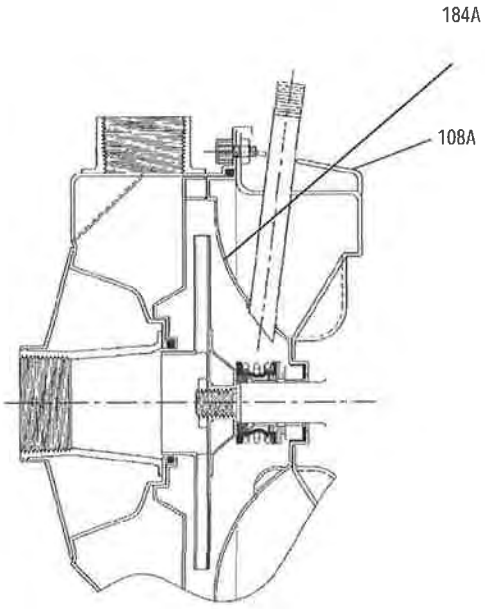
No todas las combinaciones de las opciones de motor, impulsor y sello están disponibles para cada modelo de bombas. Por favor verifique con G&L en los números no catalogados.

Todos los motores estándar de 3500 RPM, ODP (abiertos resguardados) y TEFC (totalmente encerrados con enfriamiento forzado) provistos por Goulds Pumps tienen un factor mínimo de servicio de 1,15. Las unidades estándar de catálogo pueden utilizar el factor de servicio disponible. Verificar el factor de servicio disponible de todo motor no provisto por Goulds Pumps.

NPE CLOSE COUPLED PUMP MAJOR COMPONENTS: MATERIALS OF CONSTRUCTION
BOMBA CERRADA ACOPLADA NPE COMPONENTES PRINCIPALES: MATERIALES DE CONSTRUCCIÓN



1½, 2 and 3 HP
1½, 2 y 3 HP



Seal Face Vent/Flush Option,
Opción Cara del Sello Válvula/Chorro

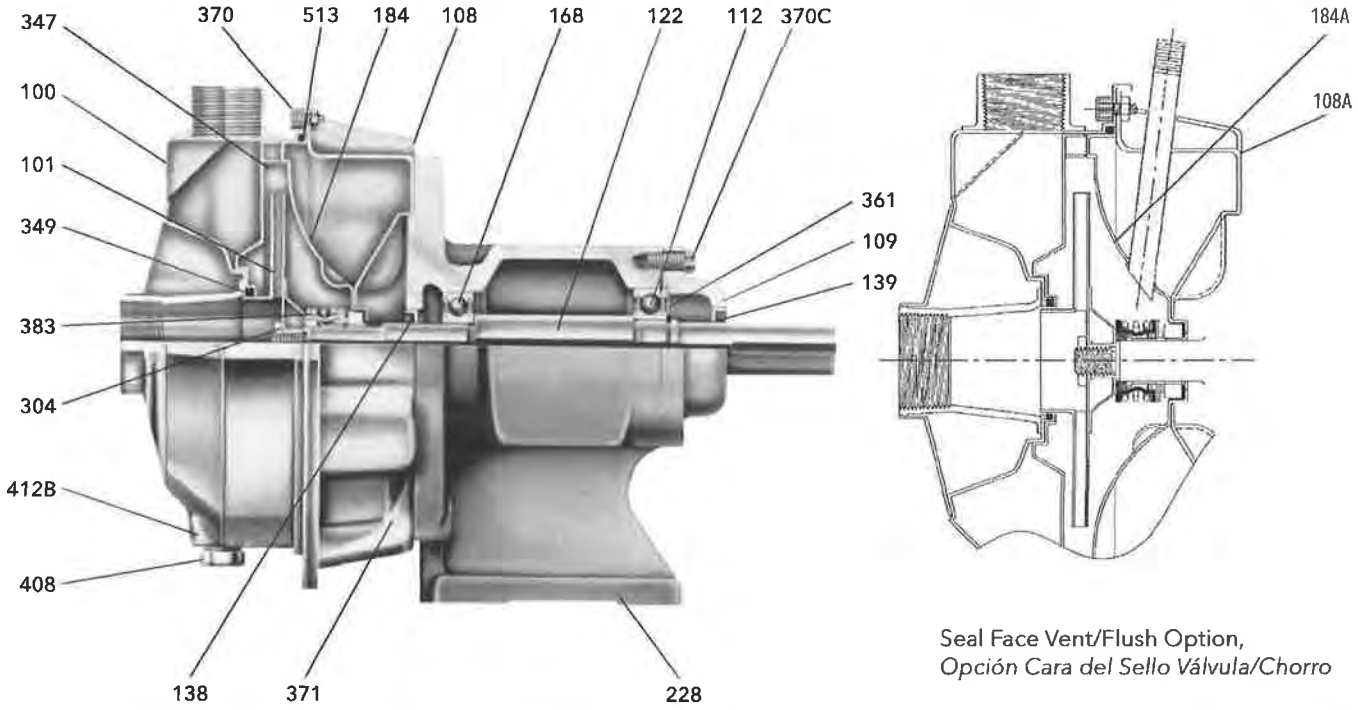
Item No., *Parte No.*	Description, *Descripción*	Materials, *Materiales*
100	Casing; *Carcasa*	AISI 316L SS; *AISI 316L Acero inoxidable*
101	Impeller; *Impulsor*	
108	Motor adapter; *Adaptador del motor*	
108A	Motor adapter seal vent/flush; *Sello válvula/chorro del adaptador del motor*	
123	Deflector; *Deflector*	BUNA-N
184	Seal housing; *Alojamiento del sello*	AISI 316L SS; *AISI 316L Acero inoxidable*
184 A	Seal housing seal vent/flush; *Sello válvula/chorro del alojamiento del sello*	
347	Guidevane; *Difusor*	
349	Seal ring, guidevane; *Anillo del sello, difusor*	Viton
370	Socket head screws, casing; *Encajes cabezas de tornillos, carcasa*	AISI 410 SS; *AISI 410 Acero inoxidable*
371	Bolts, motor; *Tornillos, motor*	Plated steel; *Acero chapeado*
383	Mechanical seal; *Sello mecánico*	**see chart, *ver tabla*
408	Drain and vent plug, casing; *Enchufes de drenaje y válvula, carcasa*	AISI 316L SS; *AISI 316L Acero inoxidable*
412B	O-ring, drain and vent plug; *Anillo 'O', enchufe de drenaje y válvula*	Viton (Standard, *estándar*) EPR (Optional, *Opcional*)
513	O-ring, casing; *Anillo 'O', carcasa*	
Motor *Motor*	NEMA standard, 56J flange; *NEMA estándar, brida 56J*	

½, ¾ and 1 HP
½, ¾ y 1 HP

Footed motor for 5 HP ODP and TEFC, all explosion proof motors, see page 13.

Motor con pie para 5 HP ODP y TEFC, a prueba de explosiones motores, en la página 13.

NPE FRAME MOUNTED PUMP MAJOR COMPONENTS: MATERIALS OF CONSTRUCTION
BOMBA NPE DE ARMAZÓN MONTADO COMPONENTES PRINCIPALES: MATERIALES DE CONSTRUCCIÓN

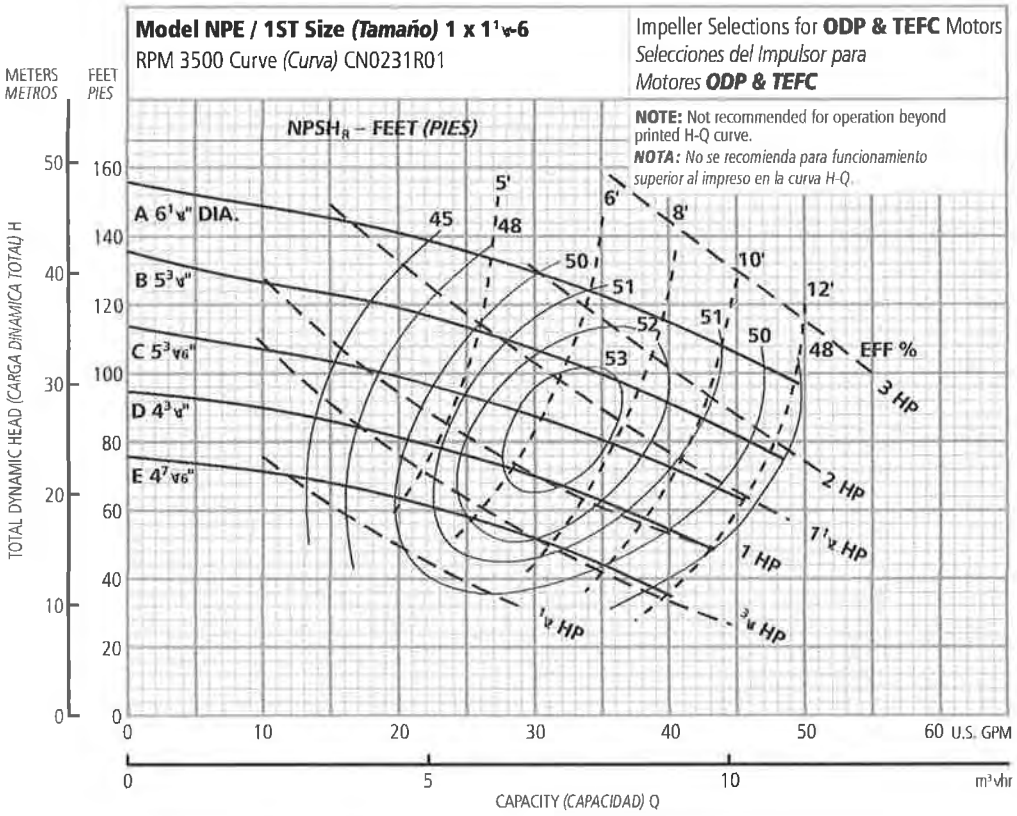


Seal Face Vent/Flush Option,
Opción Cara del Sello Válvula/Chorro

Item No., *Parte No.*	Description, *Descripción*	Materials, *Materiales*
100	Casing; *Carcasa*	AISI 316L SS; *AISI 316L Acero inoxidable*
101	Impeller; *Impulsor*	
108	Adapter; *Adaptador*	
108A	Motor adapter seal vent/flush; *Sello válvula/chorro del adaptador del motor*	
109	Bearing cover; *Cubierta de balineras*	Cast iron; *Hierro fundido*
112	Ball bearing (outboard); *Balineras de bolas (exterior)*	Steel; *Acero*
122	Shaft; *Eje*	AISI 316 SS; *AISI 316 Acero inoxidable*
138	Lip-seal (inboard); *Sello cubierto (interior)*	BUNA/steel; *BUNA/acero*
139	Lip-seal (outboard); *Sello cubierto (exterior)*	BUNA/steel; *BUNA/acero*
168	Ball bearing (inboard); *Balineras de bolas (interior)*	Steel; *Acero*
184	Seal housing; *Alojamiento del sello*	AISI 316L SS; *AISI 316L Acero inoxidable*
184 A	Seal housing seal vent/flush; *Sello válvula/chorro del alojamiento del sello*	
228	Bearing frame; *Armazón de balineras*	Cast iron, *Hierro fundido*

Item No., *Parte No.*	Description, *Descripción*	Materials, *Materiales*
304	Impeller locknut; *Contratuerca del impulsor*	AISI 316 SS; *AISI 316 Acero inoxidable*
347	Guidevane; *Difusor*	
349	Seal ring, guidevane; *Anillo del sello, difusor*	Viton
361	*Retaining ring; Anillo de retención*	Steel; Acero
370	Socket head screws, casing; *Encaje cabeza del tornillo, carcasa*	AISI 410 SS; *AISI 410 Acero inoxidable*
370C	Hex head screw, bearing cover; *Tornillo de cabeza hexagonal, cubierta de balineras*	Plated steel; *Acero chapeado*
371	Hex head screw, bearing frame; *Tornillo de cabeza hexagonal, armazón de balineras*	Plated steel; *Acero chapeado*
383	Mechanical seal; *Sello mecánico*	**see chart; ver tabla
400	Shaft key; *Llave del eje*	Steel; Acero
408	Drain and vent plug, casing; *Enchufes de drenaje y válvula, carcasa*	AISI 316 SS; *AISI 316 Acero inoxidable*
412B	*O-ring*, drain and vent plug; *Anillo 'O', enchufe de drenaje y válvula*	Viton (Standard, *estándar*) EPR (Optional, *Opcional*)
513	O-ring, casing; *Anillo 'O', carcasa*	

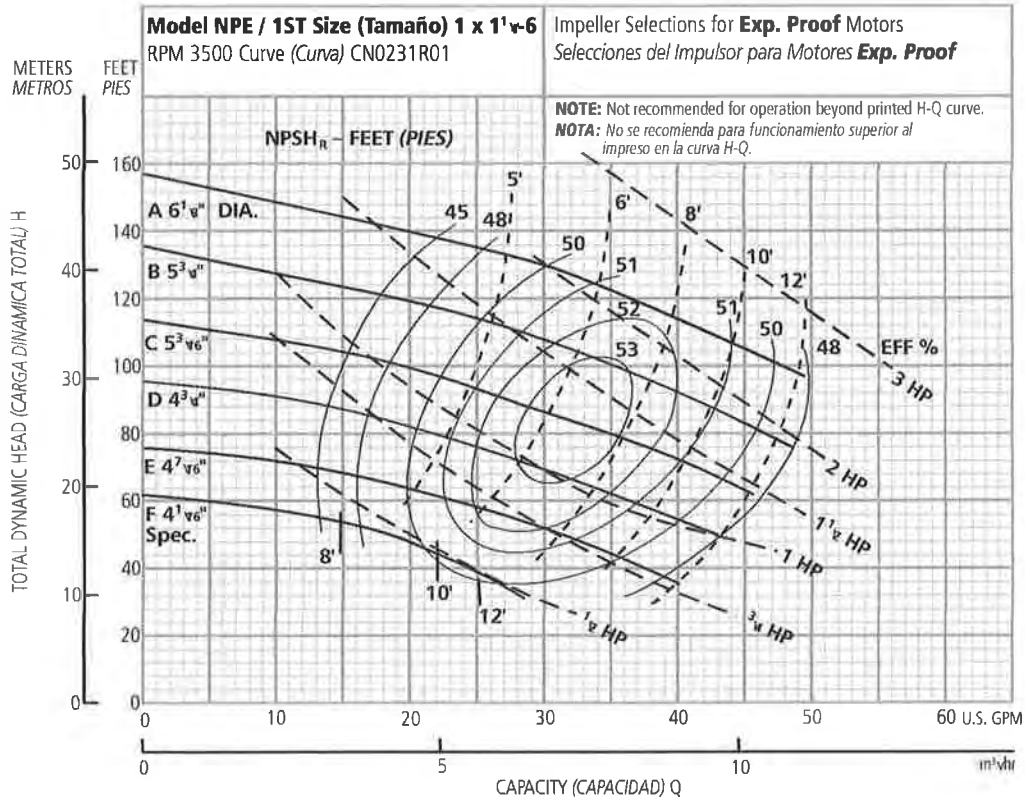
PERFORMANCE CURVES - 60 HZ, 3500 RPM
CURVAS DE FUNCIONAMIENTO - 60 HZ, 3500 RPM



Ordering Code, Código de Pedido	Standard HP Rating, Estándar HP Potencia	Imp. Dia.
E	½	4 7/16"
D	¾	4¾
C	1	5 3/16
B	1½	5¾
A	2	6⅛

NOTE: Although not recommended, the pump may pass a 1/16" sphere.

NOTA: *Si bien no se recomienda, la bomba puede pasar una esfera de 1/16".*

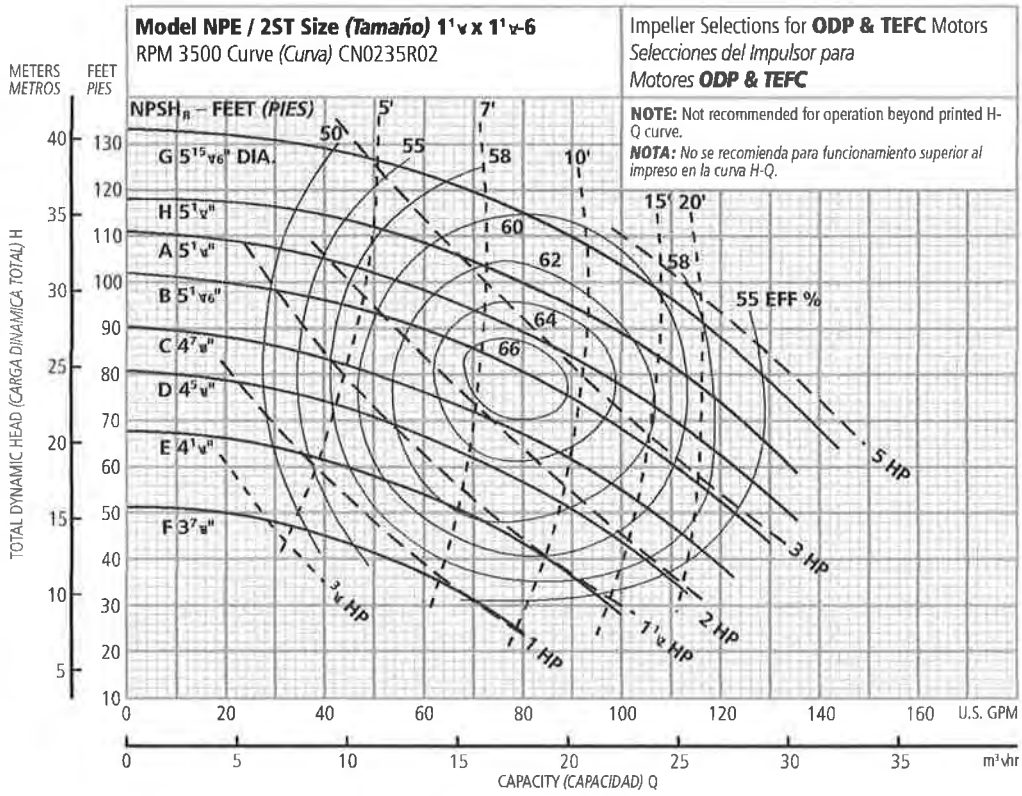


Ordering Code, Código de Pedido	Standard HP Rating, Estándar HP Potencia	Imp. Dia.
F	½	4 1/16" spec.
E	¾	4 7/16
D	1	4¾
C	1½	5 3/16
B	2	5¾
A	3	6⅛

NOTE: Although not recommended, the pump may pass a 1/16" sphere.

NOTA: *Si bien no se recomienda, la bomba puede pasar una esfera de 1/16".*

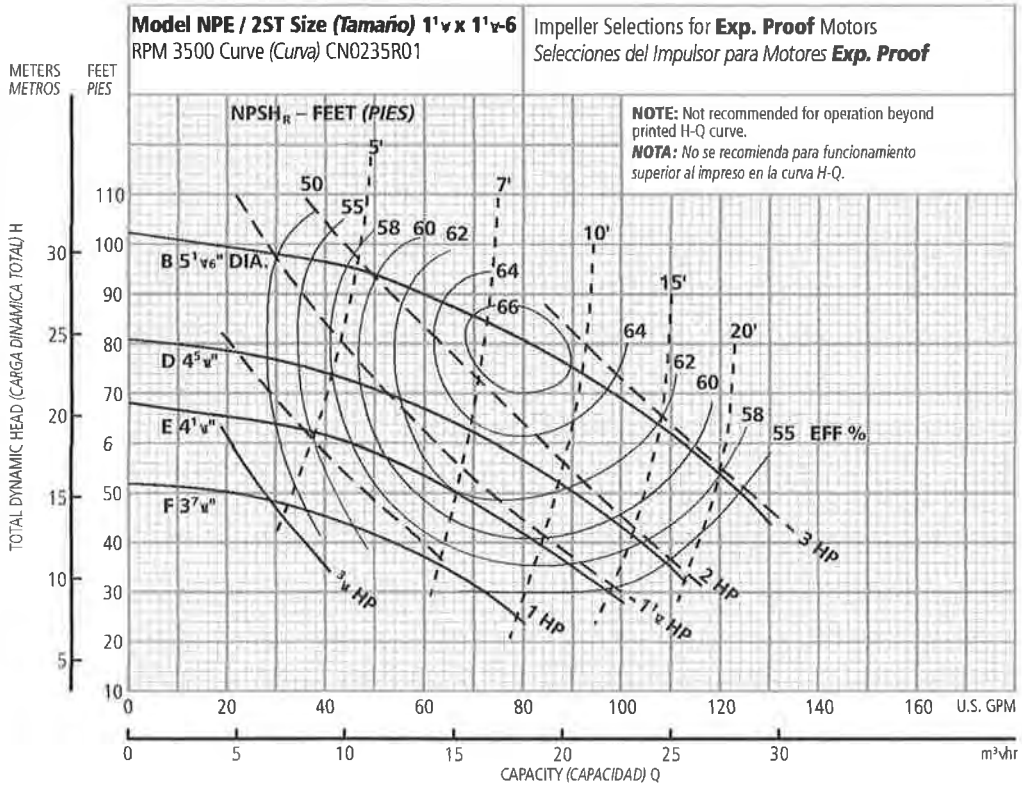
PERFORMANCE CURVES - 60 HZ, 3500 RPM
CURVAS DE FUNCIONAMIENTO - 60 HZ, 3500 RPM



Ordering Code, Código de Pedido	Standard HP Rating, Estándar HP Potencia	Imp. Dia.
F	¾	3⅞"
E	1	4¼
D	1½	4⅝
C	2	4⅞
B	3	5¹⁄₁₆
A	3	5¼
H	5	5½
G	5	5¹⁵⁄₁₆

NOTE: Although not recommended, the pump may pass a 3⁄16" sphere.

NOTA: *Si bien no se recomienda, la bomba puede pasar una esfera de 3⁄16".*

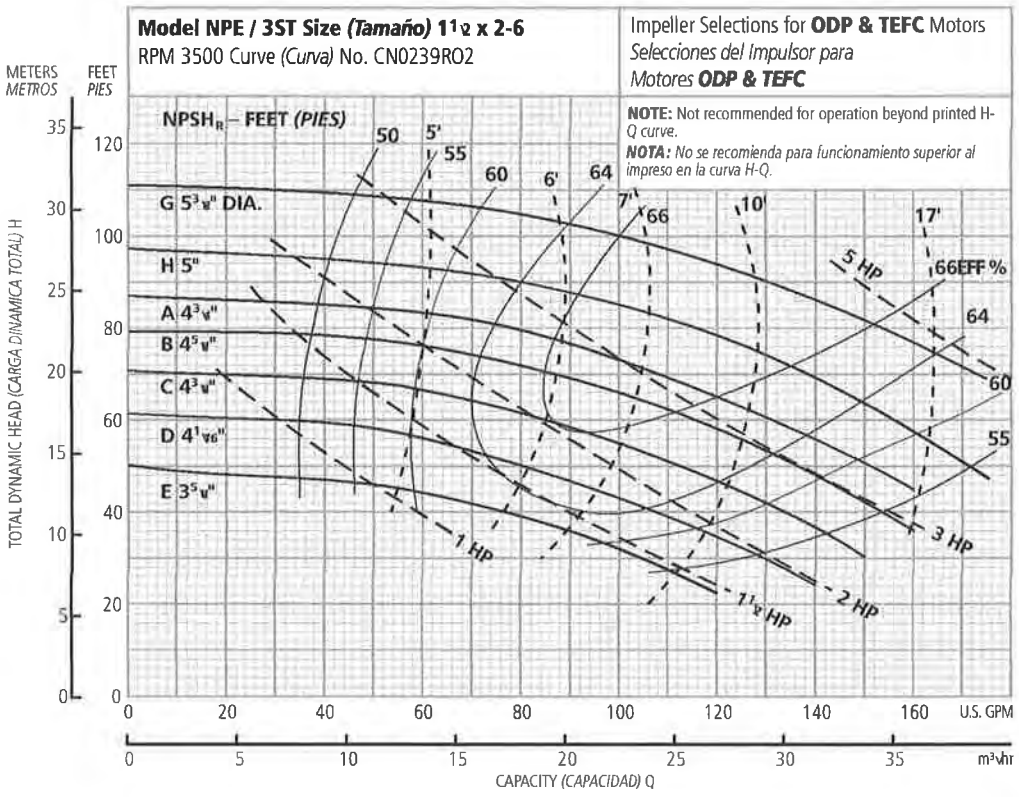


Ordering Code, Código de Pedido	Standard HP Rating, Estándar HP Potencia	Imp. Dia.
F	1	3⅞"
E	1½	4¼
D	2	4⅝
B	3	5¹⁄₁₆

NOTE: Although not recommended, the pump may pass a 3⁄16" sphere.

NOTA: *Si bien no se recomienda, la bomba puede pasar una esfera de 3⁄16".*

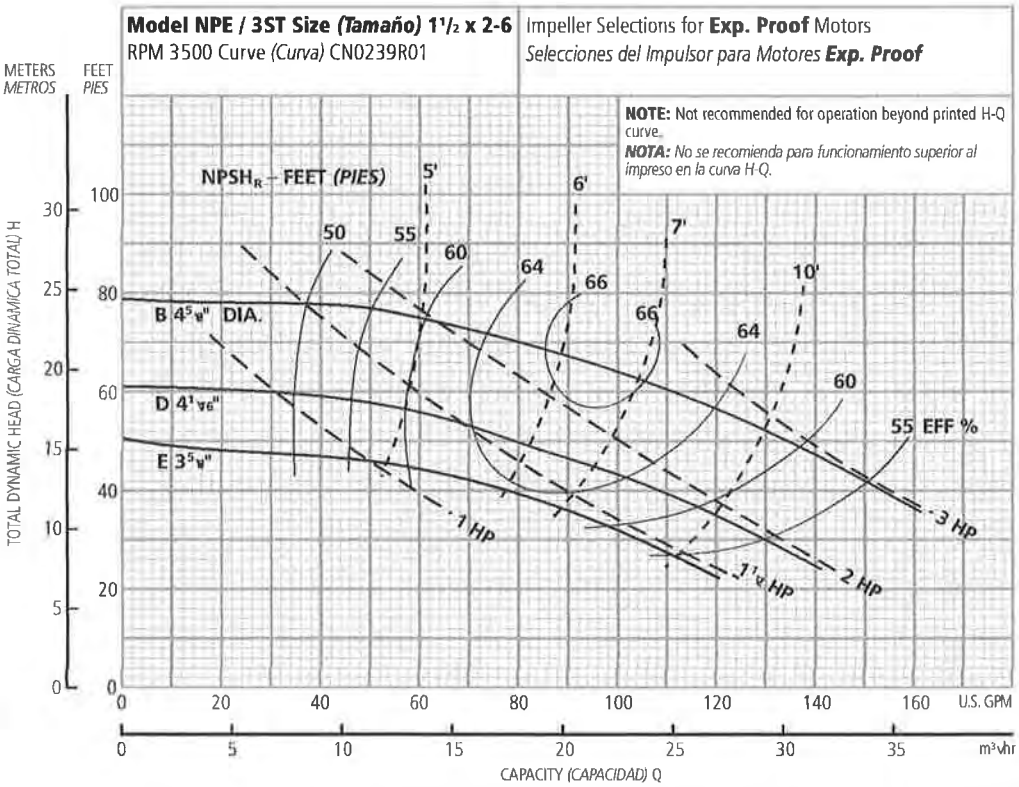
PERFORMANCE CURVES - 60 HZ, 3500 RPM
CURVAS DE FUNCIONAMIENTO - 60 HZ, 3500 RPM



Ordering Code, Código de Pedido	Standard HP Rating, Estándar HP Potencia	Imp. Dia.
E	1	3⅝"
D	1½	4 1/16
C	2	4⅜
B	3	4⅝
A	3	4¾
H	5	5
G	5	5⅜

NOTE: Although not recommended, the pump may pass a 11/32" sphere.

NOTA: *Si bien no se recomienda, la bomba puede pasar una esfera de 11/32".*

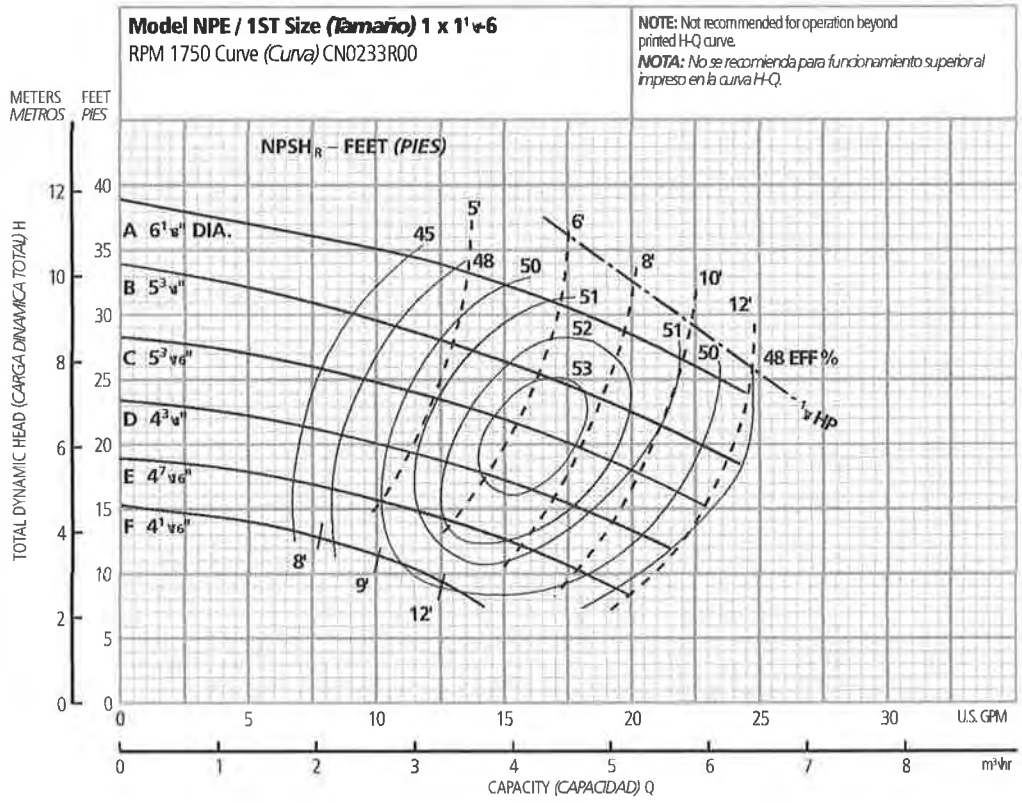


Ordering Code, Código de Pedido	Standard HP Rating, Estándar HP Potencia	Imp. Dia.
E	1½	3⅝"
D	2	4 1/16
B	3	4⅝

NOTE: Although not recommended, the pump may pass a 11/32" sphere.

NOTA: *Si bien no se recomienda, la bomba puede pasar una esfera de 11/32".*

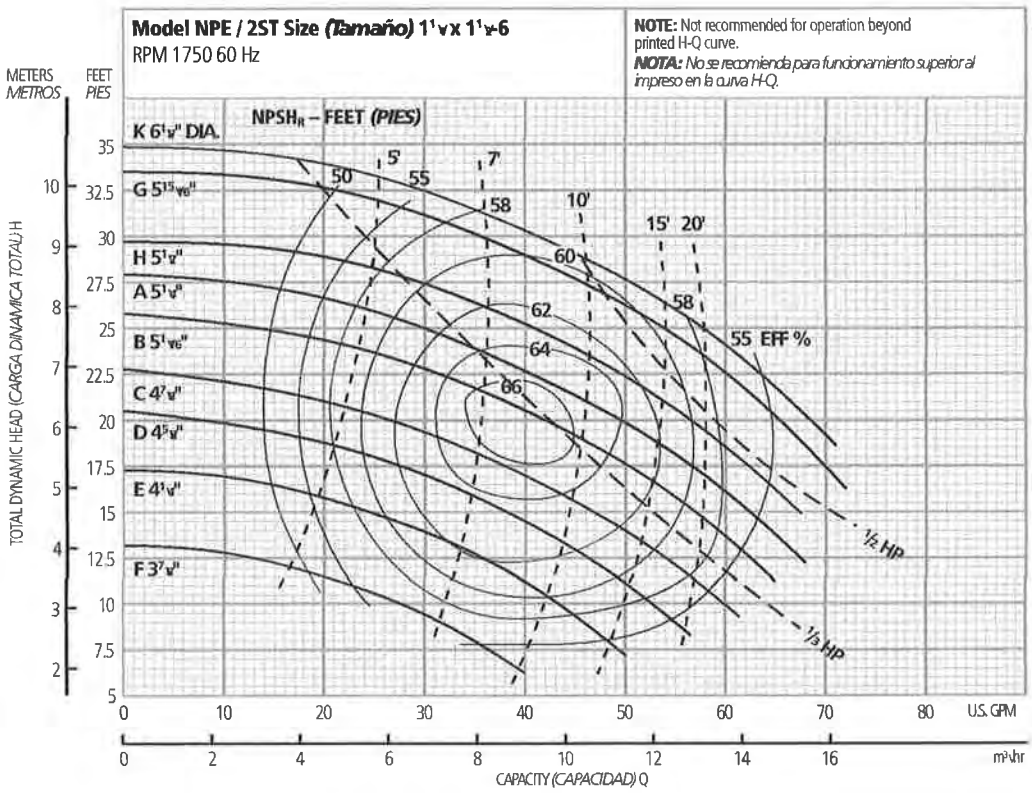
PERFORMANCE CURVES - 60 HZ, 1750 RPM
CURVAS DE FUNCIONAMIENTO - 60 HZ, 1750 RPM



Optional Impeller, Impulsor Opcional	
Ordering Code, Código de Pedido	**Dia.**
A	6⅛"
B	5¾
C	5⅜
D	4¾
E	4⅞
F	4⅛

NOTE: Although not recommended, the pump may pass a 1/16" sphere.

NOTA: *Si bien no se recomienda, la bomba puede pasar una esfera de 1/16".*

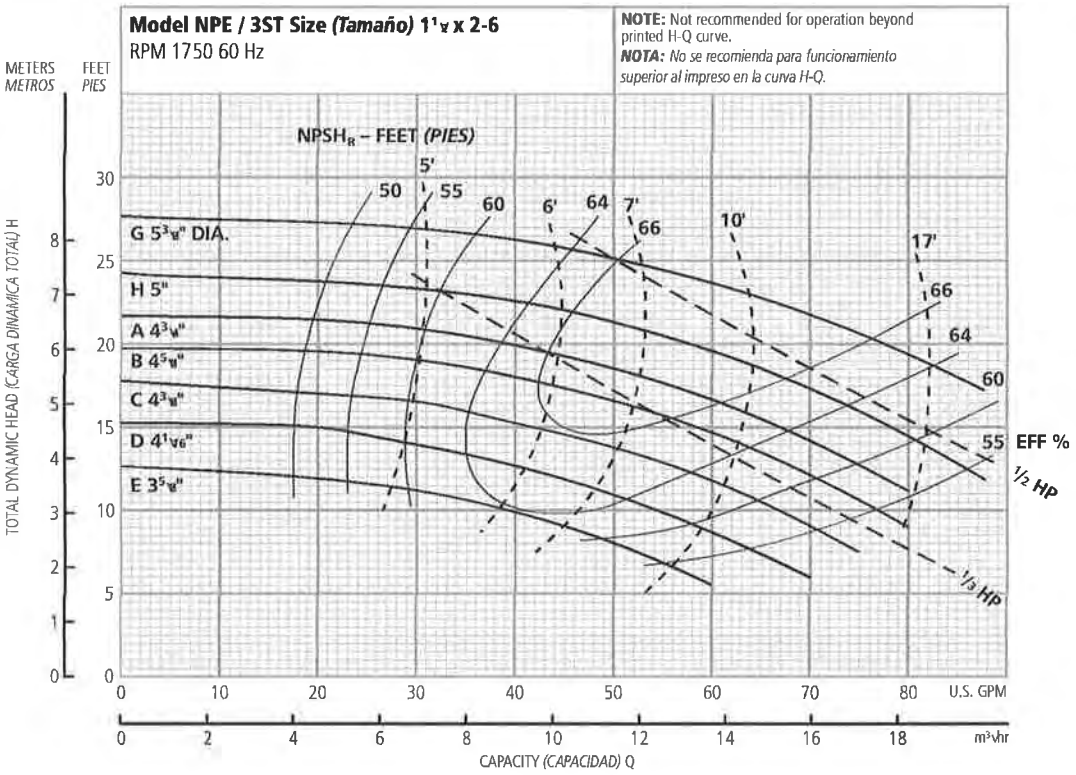


Optional Impeller, Impulsor Opcional	
Ordering Code, Código de Pedido	**Dia.**
K	6⅛"
G	5¹⁵⁄₁₆"
H	5½
A	5¼
B	5⅛
C	4⅞
D	4⅝
E	4¼
F	3⅞

NOTE: Although not recommended, the pump may pass a 3/16" sphere.

NOTA: *Si bien no se recomienda, la bomba puede pasar una esfera de 3/16".*

PERFORMANCE CURVES - 60 HZ, 1750 RPM
CURVAS DE FUNCIONAMIENTO - 60 HZ, 1750 RPM

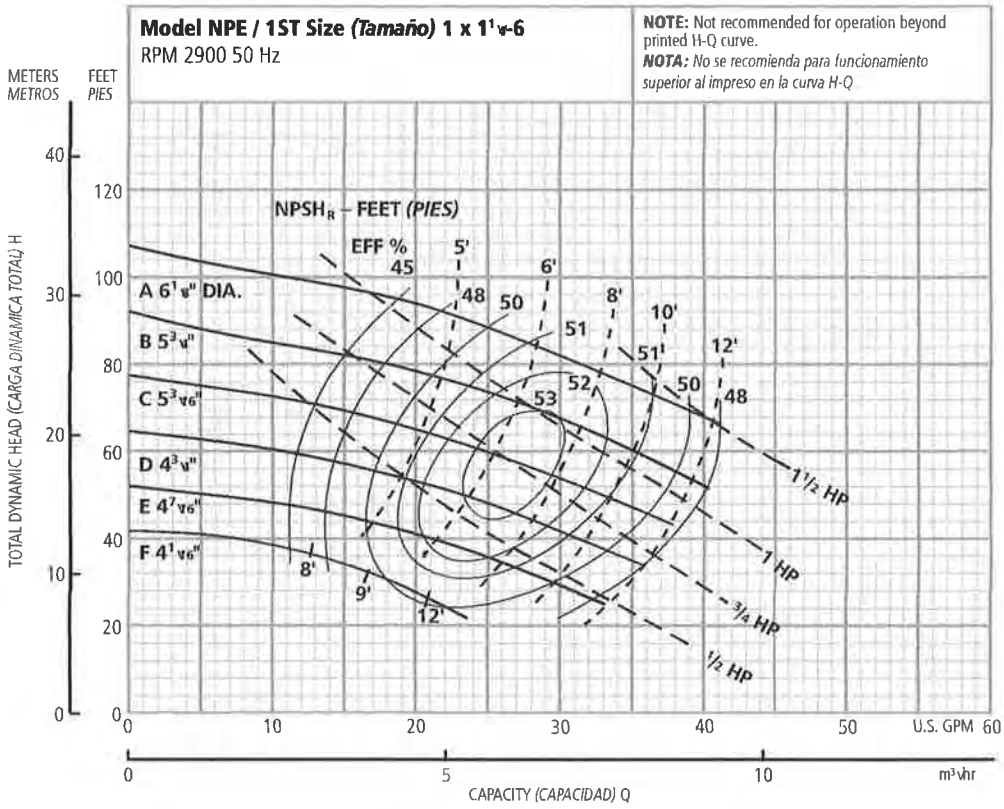


Optional Impeller, *Impulsor Opcional*	
Ordering Code, *Código de Pedido*	**Dia.**
G	5⅜"
H	5
A	4¾
B	4⅝
C	4⅜
D	4 1/16
E	3⅝

NOTE: Although not recommended, the pump may pass a 11/32" sphere.

NOTA: *Si bien no se recomienda, la bomba puede pasar una esfera de 11/32".*

PERFORMANCE CURVES - 50 HZ, 2900 RPM
CURVAS DE FUNCIONAMIENTO - 50 HZ, 2900 RPM

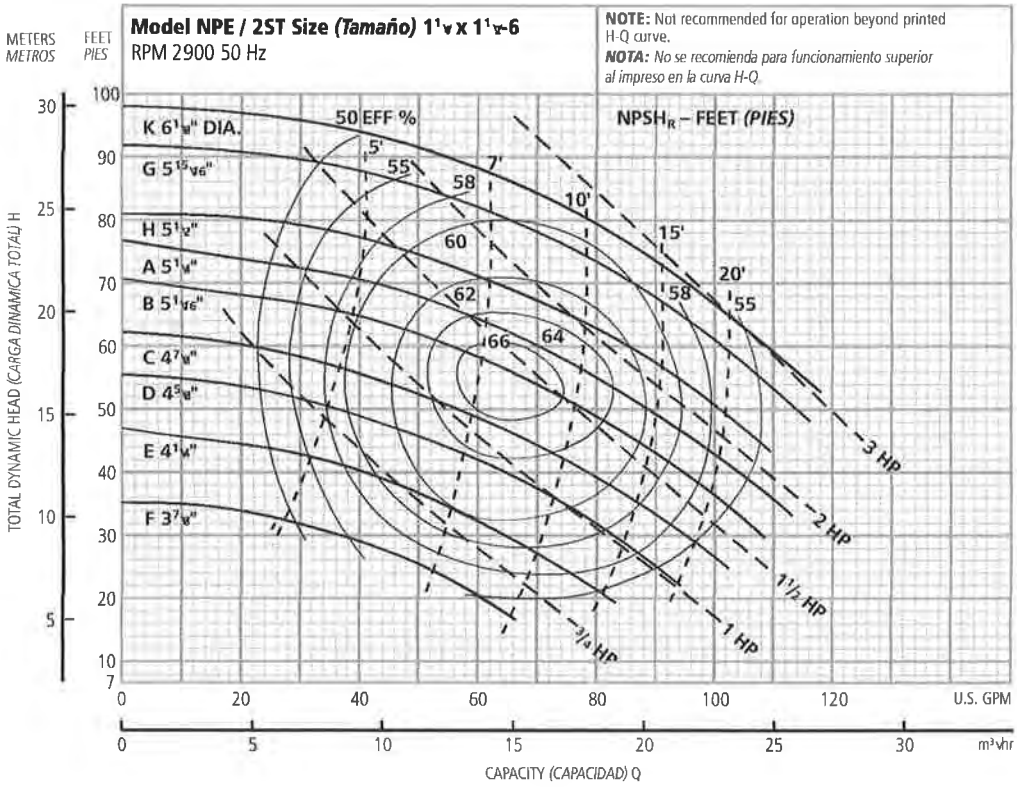


Optional Impeller, *Impulsor Opcional*	
Ordering Code, *Código de Pedido*	**Dia.**
A	6⅛"
B	5¾
C	5 3/16
D	4¾
E	4 7/16
F	4 1/16

NOTE: Although not recommended, the pump may pass a 1/16" sphere.

NOTA: *Si bien no se recomienda, la bomba puede pasar una esfera de 1/16".*

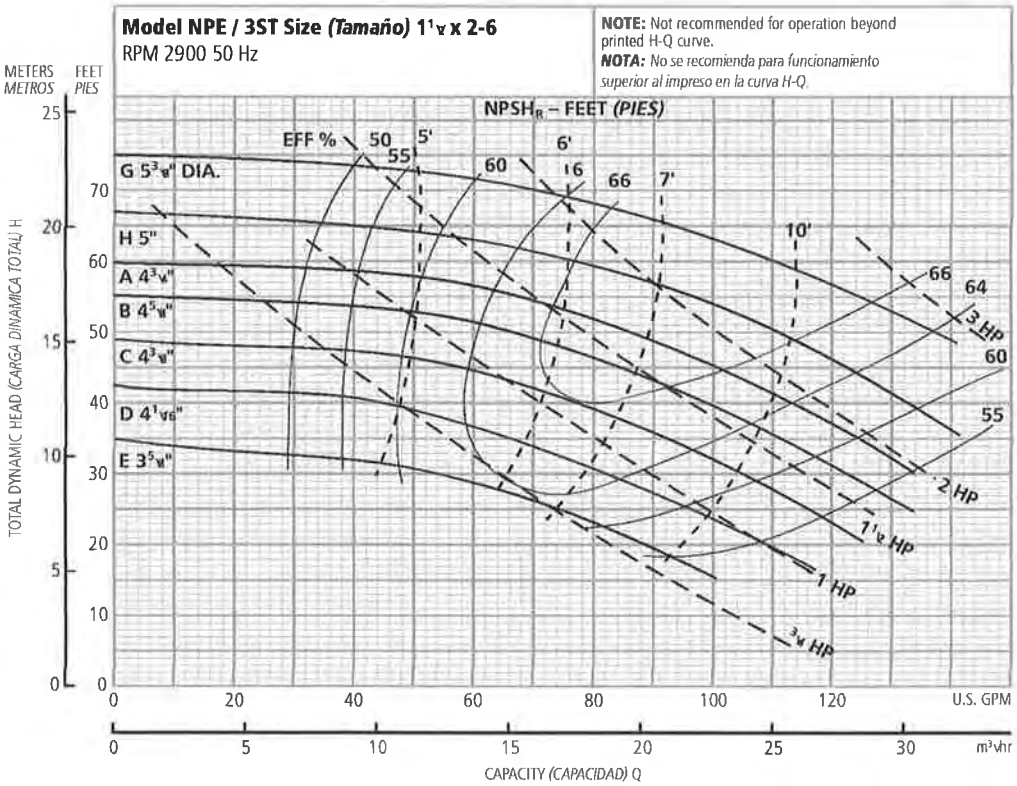
PERFORMANCE CURVES - 50 HZ, 2900 RPM
CURVAS DE FUNCIONAMIENTO - 50 HZ, 2900 RPM



Optional Impeller, *Impulsor Opcional*	
Ordering Code, *Código de Pedido*	**Dia.**
K	6⅛"
G	5 15/16"
H	5½
A	5¼
B	5 1/16
C	4⅞
D	4⅝
E	4¼
F	3⅞

NOTE: Although not recommended, the pump may pass a 3/16" sphere.

NOTA: *Si bien no se recomienda, la bomba puede pasar una esfera de 3/16".*



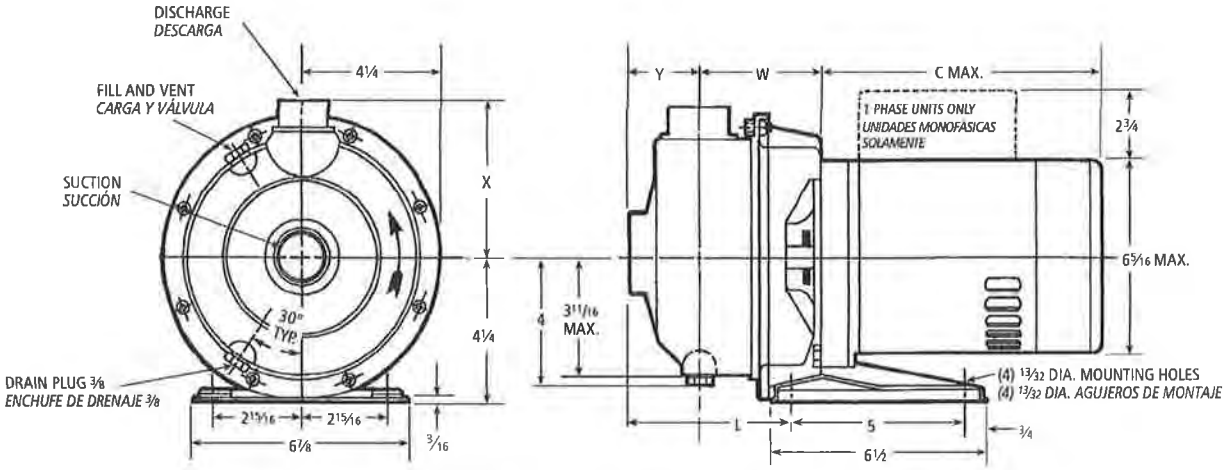
Optional Impeller, *Impulsor Opcional*	
Ordering Code, *Código de Pedido*	**Dia.**
G	5⅜"
H	5
A	4¾
B	4⅝
C	4⅜
D	4 1/16
E	3⅝

NOTE: Although not recommended, the pump may pass a 11/32" sphere.

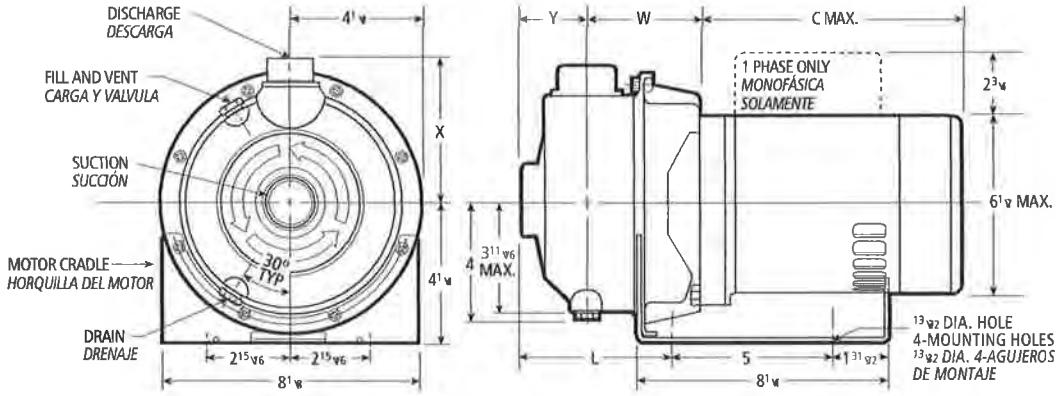
NOTA: *Si bien no se recomienda, la bomba puede pasar una esfera de 11/32".*

NPE CLOSE COUPLED - DIMENSIONS, WEIGHTS AND SPECIFICATIONS
NPE ACOPLE CERRADO - DIMENSIONES, PESOS Y ESPECIFICACIONES

Clockwise Rotation Viewed from Drive End
Rotación en Dirección de las Agujas del Reloj Visto desde el Extremo del Motor



ODP and TEFC ½, ¾ and 1 HP (standard), *ODP y TEFC ½, ¾ y 1 HP (estándar)*



ODP and TEFC 1½, 2 and 3 HP (standard), *ODP y TEFC 1½, 2 y 3 HP (estándar)*

SPECIFICATIONS - *ESPECIFICACIONES*

Capacities to:
85 GPM (322L/min) at 1750 RPM
170 GPM (643L/min) at 3500 RPM

Heads to:
39 feet (12 m) at 1750 RPM
150 feet (46 m) at 3500 RPM

Working pressures to:
125 PSIG (9 bars)

Maximum temperatures to: 250° F (121° C)

Direction of rotation:
Clockwise when viewed from motor end.

Motor specifications:
NEMA 56J frame, 1750 RPM, ½ HP. 3500 RPM ½ through 5 HP. Open drip-proof, totally enclosed fan-cooled or explosion proof enclosures. Stainless steel shaft with ball bearings.

Single phase: Voltage 115/230 ODP and TEFC. (3 and 5 HP model - 230 V only) Built-in overload with auto-reset provided.

Three phase: Voltage 208-230/460 ODP, TEFC and EX PROOF.

NOTE: For three phase motors, overload protection must be provided in starter unit. Starter and heaters must be ordered separately.

Capacidades:
85 GPM (322L/min) a 1750 RPM
170 GPM (643L/min) a 3500 RPM

Cargas:
39 pies (12 m) a 1750 RPM
150 pies (46 m) a 3500 RPM

Presión de trabajo:
125 PSIG (9 baras)

Temperatura máxima:
250 ° F (121 ° C)

Dirección de rotación:
En dirección de las agujas del reloj visto desde el extremo final del motor.

Motores:
Armazón 56J NEMA, 1750 RPM ½ HP. 3500 RPM ½ a 5 HP. Cubiertas abiertas resguardadas, totalmente encerradas enfriadas por ventilador o a prueba de explosiones. Eje de acero inoxidable con balineras de bolas.

Monofásicos: *Voltaje 115/230 ODP y TEFC. (modelo 3 y 5 HP - 230 voltios solamente) Se proporciona protección térmica contra sobrecarga construida con reseteo automático.*

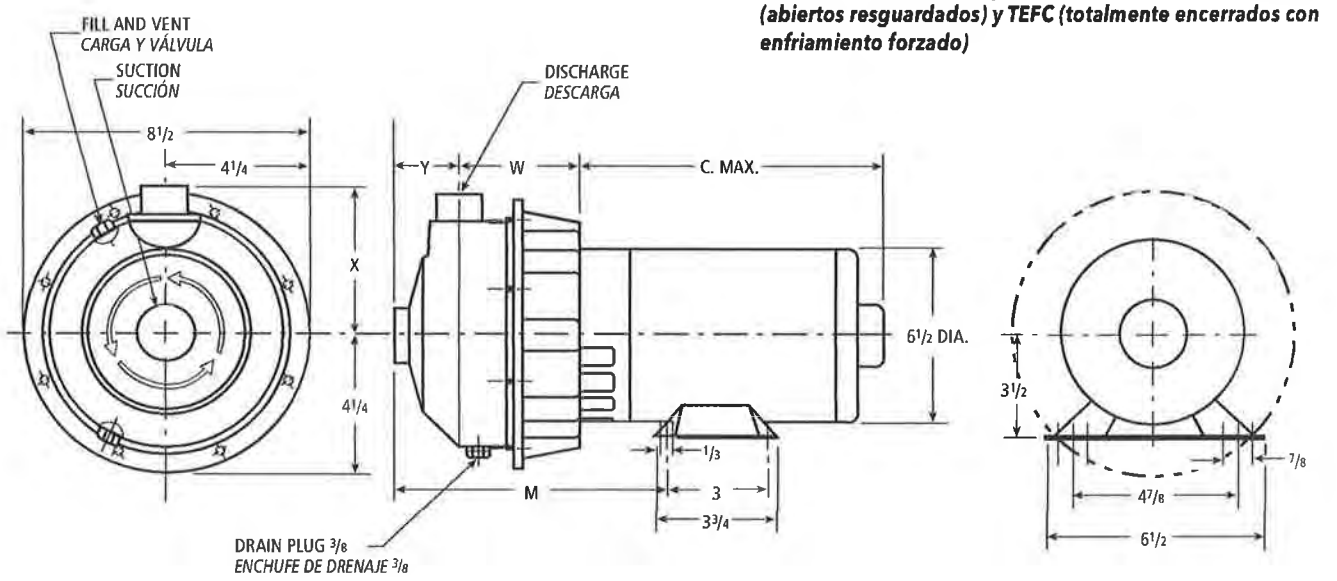
Trifásicos: *Voltaje 208-230/460 ODP, TEFC y EX PROOF.*

NOTA: *Para motores trifásicos se debe de proporcionar la protección térmica contra sobrecarga en la unidad de arranque. El arrancador y los calentadores se deben pedir por separado.*

NPE CLOSE COUPLED WITH FOOTED MOTOR, EXPLOSION-PROOF AND 5 HP MOTORS
NPE ACOPLE CERRADO CON MOTOR CON PATAS, MOTORES A PRUEBA DE EXPLOSIÓN Y 5 HP

All Explosion Proof Motors and 5 HP ODP and TEFC

Todos los motores son a prueba de explosiones, 5 HP, ODP (abiertos resguardados) y TEFC (totalmente encerrados con enfriamiento forzado)



Dimensions - Determined by Pump,
Dimensiones - Determinadas por la Bomba

Pump, *Bomba*	Suction, *Succión*	Discharge, *Descarga*	HP	W	X	Y	L	M
1ST	1¼	1	½ - 3	3 5/16	4⅜	2	4 9/16	7 5/16
2ST	1½	1¼	¾ - 5	3¾	4½	2⅛	5⅛	7⅞
3ST	2	1½	1 - 5	3¾	4⅝	2⅛	5⅛	7⅞

Available Motor Weights and Dimensions
Pesos y Dimensiones Disponibles del Motor

HP	Motor Weights, *Pesos del Motor*						C Max. Length, *(Longitud)*
	1 Phase, *Monofásicos*			3 Phase, *Trifásicos*			
	ODP	TEFC	EXP	ODP	TEFC	EXP	
½	16	21	47	19	18	27	10 3/16
¾	19	24	41	21	21	30	10 7/16
1	22	26	49	23	21	30	11 1/16
1½	28	35	56	27	27	37	11 15/16
2	33	39	60	32	33	44	12 11/16
3	40	43	–	41	37	–	13 9/16
5	42	–	–	42	45	–	13 9/16

Dimensions in inches, weights in pounds.
Dimensiones en pulgadas, pesos en libras.

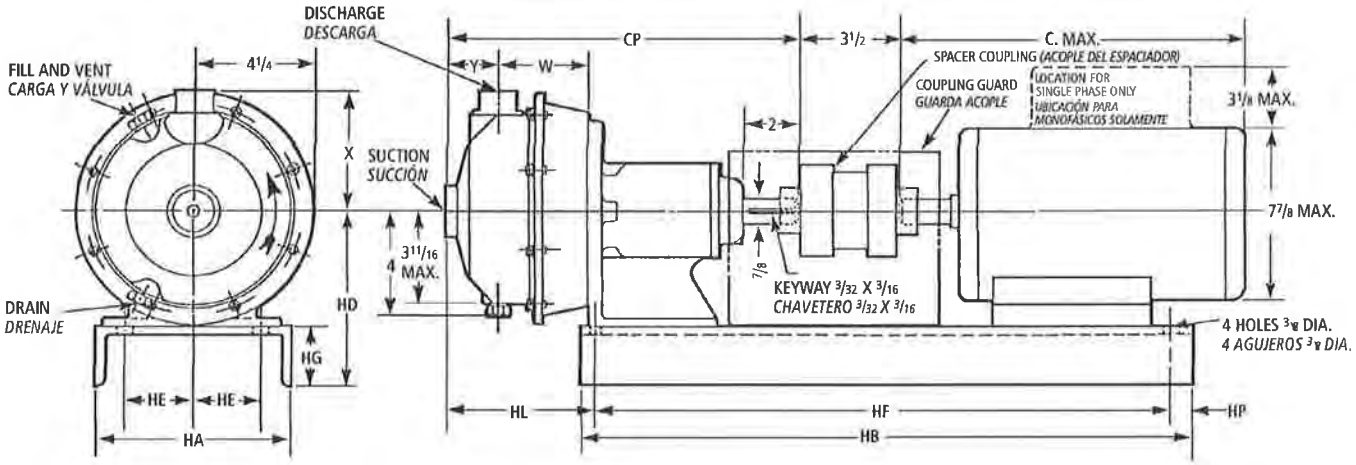
NOTES:

1. Pump will be shipped with top vertical discharge position as standard. For other orientations, remove casing bolts, rotate discharge to desired position, replace and tighten 6mm bolts to 5 - 6 lbs.-ft.
2. Motor dimensions may vary with motor manufacturers.
3. Dimensions in inches, weights in pounds.
4. For explosion proof motor dimensions consult factory for information.
5. Not to be used for construction purposes unless certified.

NOTAS:

1. *Las bombas se transportarán con la descarga vertical superior como estándar. Para otras orientaciones, retirar los tornillos de la carcasa, rotar la descarga a la posición deseada, y reemplazar y apretar los tornillos de 6mm a 5 - 6 libras-pies.*
2. *Las dimensiones del motor puede que varíen con los fabricantes.*
3. *Dimensiones en pulgadas, pesos en libras.*
4. *Para las dimensiones de los motores a prueba de explosión consultar con la fábrica para información.*
5. *No usar para propósitos de construcción sin certificar.*

NPE FRAME MOUNTED - DIMENSIONS, WEIGHTS AND SPECIFICATIONS
NPE ARMAZÓN MONTADO - DIMENSIONES, PESOS Y ESPECIFICACIONES



SPECIFICATIONS
ESPECIFICACIONES

Capacities to:
85 GPM (322L/min) at 1750 RPM
170 GPM (643L/min) at 3500 RPM

Heads to:
39 feet (12 m) at 1750 RPM
150 feet (47 m) at 3500 RPM

Working pressures to:
125 PSIG (9 bars)

Maximum temperatures to: 250°F (121°C)

Direction of rotation:
Clockwise when viewed from motor end.

Motor specifications:
T-frame single and three phase. Open drip-proof, TEFC or explosion proof enclosures are available for 60 Hz, 3500 and 1750 RPM operation.

For three phase motors, overload protection must be provided in starter unit. Starter and heaters must be ordered separately.

Capacidades:
85 GPM (322L/min) a 1750 RPM
170 GPM (643L/min) a 3500 RPM

Cargas:
39 pies (12 m) a 1750 RPM
150 pies (47 m) a 3500 RPM

Presión de trabajo:
125 PSIG (9 baras)

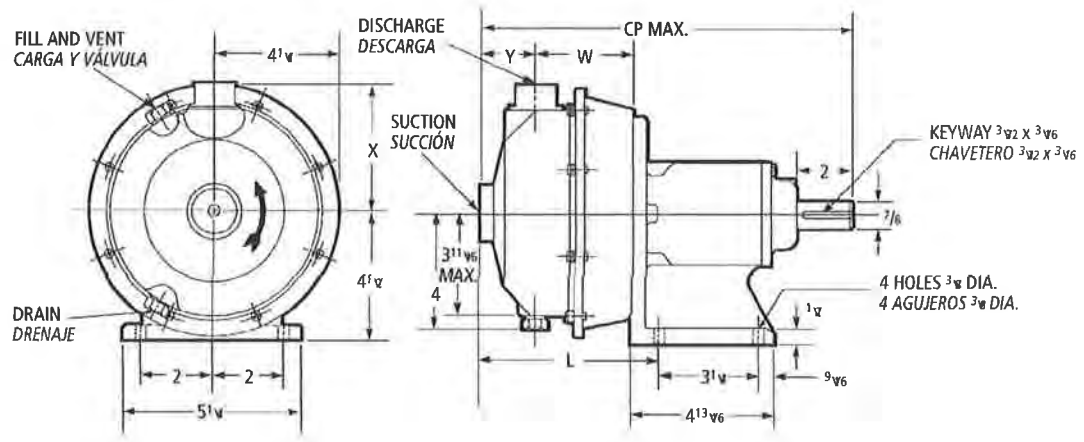
Temperatura máxima:
250°F (121°C)

Dirección de rotación: *En dirección de las agujas del reloj visto desde el extremo final del motor.*

Motores:
Armazón T- monofásico y trifásico. A prueba de goteo, TEFC o recintos a prueba de explosión están disponibles para funcionamiento de 60 Hz, 3500 y 1750 RPM.

Para motores trifásicos se debe de proporcionar la protección térmica contra sobrecarga en la unidad de arranque. El arrancador y los calentadores se deben pedir por separado.

NPE-F



Dimensions and Weights
Dimensiones y Pesos

Dimensions and Weights - Determined by Pump,
Dimensiones y Pesos - Determinados por la Bomba

Pump, *Bomba*	Suct. NPT, *Succión NPT*	Disch. NPT, *Descarga NPT*	CP	L	W	X	Y	Wt., *Peso*	Dim. "HL" Determined by Pump and Motor, *Dim. "HL" Determinadas por la Bomba y el Motor* Frame, *Armazón*		
									56	140	180
1ST	1¼	1	12 15/16	6 7/16	3 5/16	4⅜	2	22½	4 9/16		6 7/16
2ST	1½	1¼	13½	7	3¾	4½	2⅛	23	5⅛		7
3ST	2	1½				4⅝					

Available Motor and Bedplate Dimensions and Weights,
Pesos y Dimensiones Disponibles de la Fundación y del Motor

Motor Frame, *Armazón del Motor*	HA	HB	HD	HE	HF	HG	HP	Wt. Max., *Peso Máx*	Shims, *Deflector*
56 143T 145T	8	26	6⅞	3⅛	22⅜	2⅜	1	30	1"
182T 184T	10	26	7¼	3¾	24	2¾	⅞	43	–

Frame Size, *Tamaño del Armazón*	Horsepower, *Fuerza* 3500 RPM				C Max.	Wt. Max., *Peso Máx.*
	Single Phase, *Monofásicos*		Three Phase, *Trifásicos*			
	ODP	TEFC	ODP	TEFC		
56	½ - 1½	½ - 1½	½ - 1	½ - 1	13	45
143T	–	–	1½	1½	13⅜	45
145T	2	2	1½ - 3	1½ - 2	14¼	52
182T	3	3	5	3	16⅝	63
184T	5	5	–	5	18⅛	112

NOTES:

1. Pump will be shipped with top vertical discharge position as standard. For other orientations, remove casing bolts, rotate discharge to desired position, replace and tighten 6mm bolts to 5 - 6 lbs.-ft.
2. Motor dimensions may vary with motor manufacturers.
3. Dimensions in inches, weights in pounds.
4. For explosion proof motor dimensions consult factory for information.
5. Not to be used for construction purposes unless certified.

NOTAS:

1. *Las bombas se transportarán con la descarga vertical superior como estándar. Para otras orientaciones, retirar los tornillos de la carcasa, rotar la descarga a la posición deseada, y reemplazar y apretar los tornillos de 6mm a 5 - 6 libras-pies.*
2. *Las dimensiones del motor puede que varíen con los fabricantes.*
3. *Dimensiones en pulgadas, pesos en libras.*
4. *Para las dimensiones de los motores a prueba de explosión consultar con la fábrica para información.*
5. *No usar para propósitos de construcción sin certificar.*

TYPICAL APPLICATIONS, *APLICACIONES TÍPICAS*

Specifically designed for a broad range of general applications traditionally requiring various materials such as all iron, bronze fitted or all bronze construction.

- Water circulation
- Booster service
- Liquid transfer
- Spray system
- Chillers
- Washing/cleaning systems
- Injection molding cooling
- Reverse osmosis
- Air scrubbers
- Heat exchangers
- Filtration systems
- Jockey pumps
- OEM applications
- General water services

Diseñadas específicamente para una amplia variedad de aplicaciones generales, requiriendo tradicionalmente varios materiales, tales como hierro, bronce empotrado o todas las construcciones de bronce.

- *Circulación de agua*
- *Aumento de presión*
- *Transferencia de líquidos*
- *Sistemas de aspersión*
- *Enfriadores*
- *Sistemas de lavado/limpieza*
- *Enfriamiento con molde por inyección*
- *Osmosis reversa*
- *Depuradores de aire*
- *Termopermutadores*
- *Sistemas de filtración*
- *Bombas auxiliares*
- *Aplicaciones OEM*
- *Servicios generales de agua*

Brewery, *Fábrica de Cerveza*

Car Wash, *Lavadero de Autos*

Pure Water/OEM, *Agua Pura/OEM*

Pressure Booster System, *Sistema de Aumento de Presión*

Chiller, *Enfriador*

xylem
Let's Solve Water

Xylem Inc.
2881 East Bayard Street Ext., Suite A
Seneca Falls, NY 13148
Phone: (866) 325-4210
Fax: (888) 322-5877
www.xyleminc.com/brands/goulds watertechnology

McMASTER-CARR. OVER 555,000 PRODUCTS
(609) 259-8900
(609) 259-3575 (fax)
nj.sales@mcmaster.com
Text 58926

Ultra-Low Vacuum Gauge

Steel Case, 2-1/2" Dial, 1/4 Male Bottom Connection

In stock
$60.86 Each
4106K1

For Use With	Air
Pipe Connection	NPT male
Connection Material	Brass
Accuracy	±1.5% full scale (not graded)
Case Material	Black-painted steel
Lens Material	Acrylic
Dial Size	2 1/2"
Pipe Size	1/4
Connection	Bottom
Graduation Marks	2 in. of H2O
Numeric Increments	20 in. of H2O
Vacuum Range	100" to 0 in. of h20
RoHS	Not Compliant

Accommodate applications with very low vacuum. Environment temperature range is -4° to 140° F and process temperature range is -4° to 176° F. Gauges with 2 1/2" dial have a black-painted steel case and acrylic lens.

APPENDIX D

#008

West Electrical Contractors Of Newberry, Inc.

Electrical Submittals

For

Newberry Landfill Project

Panel

Motor Control

Add-A-Phase

TVSS

DOT Energy Solutions

Jon M. Dotterer

Billye L. West, President
P.O. Box 734 • 2447 Wilson Rd. • Newberry, S.C. 29108 • Phone (803) 276-1884 • Fax (803) 321-1688

A Series Panelboard Item 1 A

Panel Description

GE Type AQ Panelboard
Qty 1
225 Amp,120/240
1P3W
10 KAIC SC Fully Rated
Aluminum Bus
Nema 4S Enclosure
Surface Mounted
Bottom Feed

Main Description

Amps: 125 Amp
Poles: 2 Pole
Type: Main Breaker
Cat No.: TQD22125
Acc:
Lugs: 1-lug/ph 1-cable/lug
#1 -300 mcm

Options Included

1 - Aluminum Bus Heat Rated
1 - NEMA 4/4X STAINLESS
3 - Ground-Box bonded TGL2

Branch Devices

Qty	Amps/P	Cat#
3	20A/1P	THQB1120
23	20A/1P	Spaces
1	60A/2P	THQB2160
1	90A/2P	THQB2190

Panel Interior

Device Layout is Customer Specified

225A PANEL END FILLER

Ckt	Type	Amps/P	Type	Amps/P	Ckt
1	THQB	90/2	THQB	20/1	2
	-	-	THQB	20/1	3
4	THQB	60/2	THQB	20/1	5
	-	-	SPACE	20/1	6
7	SPACE	20/1	SPACE	20/1	8
9	SPACE	20/1	SPACE	20/1	10
11	SPACE	20/1	SPACE	20/1	12
13	SPACE	20/1	SPACE	20/1	14
15	SPACE	20/1	SPACE	20/1	16
17	SPACE	20/1	SPACE	20/1	18
19	SPACE	20/1	SPACE	20/1	20
21	SPACE	20/1	SPACE	20/1	22
23	SPACE	20/1	SPACE	20/1	24
25	SPACE	20/1	SPACE	20/1	26
27	SPACE	20/1	SPACE	20/1	28

125A 2P TQD
MAIN

225A NEUTRAL ONLY

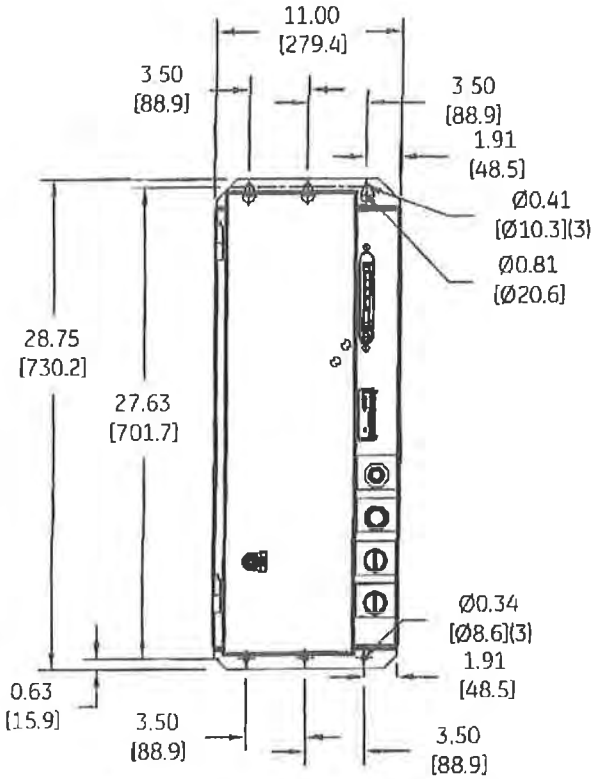
*** Drawing not to scale**

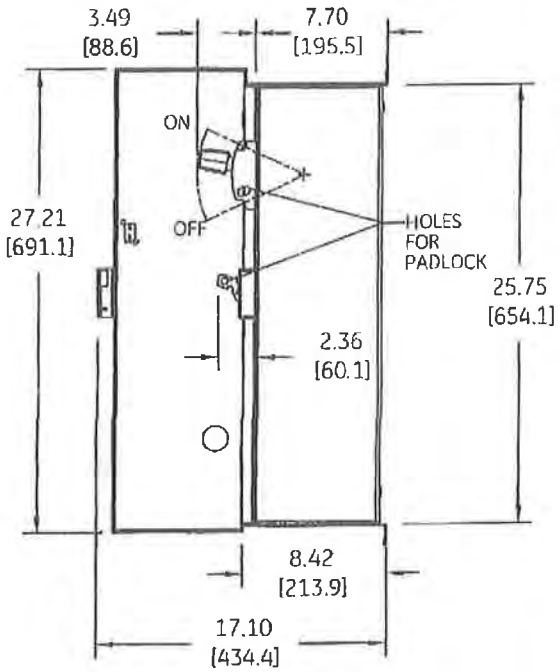
Job Name:	NEWBERRY SOIL GAS
Prop#: USA4-GZS95	**GEReq#:**
PO#:	
Marks: A	**Dated:** 02/10/2015

1A Interior	AQF1302ABX AXS5
1B Box	AB374S
1C Front	NONE
Dimensions	37.5"H x 20"W x 6.21"D

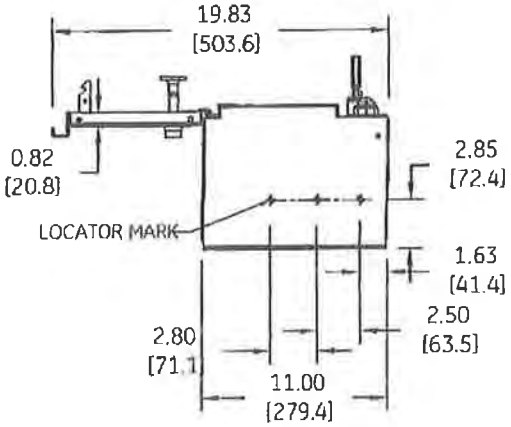
Nema 3R
Size 2

DUAL DIMENSIONS INCHES [MILLIMETERS] (ESTIMATING ONLY)

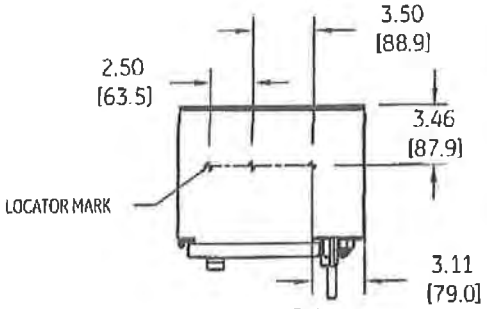




DOOR OPEN AT 90°



(BOTTOM VIEW)
DOOR OPEN AT 180°



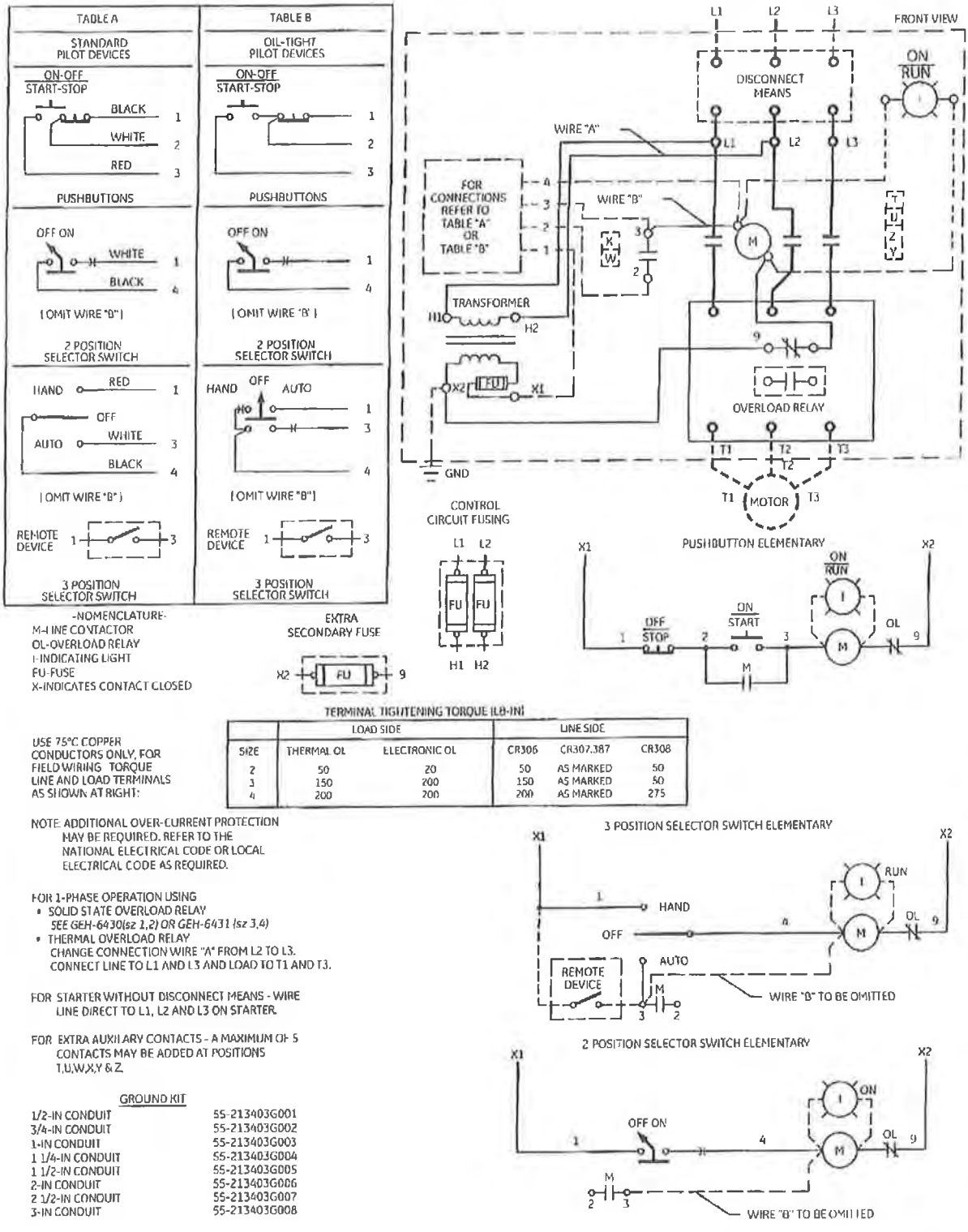
TOP VIEW

imagination at work

OUTLINE
TYPE 12/3R ENCLOSED

AN #	THIRD ANGLE PROJECTION	SHEET #	DWG NO	DATE	REV
BL-0313		1 OF 1	270A7148	12/19/2009	3

Catalog #: CR408D698RB1AALAA



-NOMENCLATURE-
M-LINE CONTACTOR
OL-OVERLOAD RELAY
I-INDICATING LIGHT
FU-FUSE
X-INDICATES CONTACT CLOSED

TERMINAL TIGHTENING TORQUE (LB-IN)

	LOAD SIDE		LINE SIDE		
SIZE	THERMAL OL	ELECTRONIC OL	CR306	CR307,387	CR308
2	50	20	50	AS MARKED	50
3	150	200	150	AS MARKED	50
4	200	200	200	AS MARKED	275

USE 75°C COPPER CONDUCTORS ONLY, FOR FIELD WIRING TORQUE LINE AND LOAD TERMINALS AS SHOWN AT RIGHT:

NOTE: ADDITIONAL OVER-CURRENT PROTECTION MAY BE REQUIRED. REFER TO THE NATIONAL ELECTRICAL CODE OR LOCAL ELECTRICAL CODE AS REQUIRED.

FOR 1-PHASE OPERATION USING
- SOLID STATE OVERLOAD RELAY
  SEE GEH-6430(sz 1,2) OR GEH-6431 (sz 3,4)
- THERMAL OVERLOAD RELAY
  CHANGE CONNECTION WIRE "A" FROM L2 TO L3.
  CONNECT LINE TO L1 AND L3 AND LOAD TO T1 AND T3.

FOR STARTER WITHOUT DISCONNECT MEANS - WIRE LINE DIRECT TO L1, L2 AND L3 ON STARTER.

FOR EXTRA AUXILIARY CONTACTS - A MAXIMUM OF 5 CONTACTS MAY BE ADDED AT POSITIONS T,U,W,X,Y & Z.

GROUND KIT

1/2-IN CONDUIT	55-213403G001
3/4-IN CONDUIT	55-213403G002
1-IN CONDUIT	55-213403G003
1 1/4-IN CONDUIT	55-213403G004
1 1/2-IN CONDUIT	55-213403G005
2-IN CONDUIT	55-213403G006
2 1/2-IN CONDUIT	55-213403G007
3-IN CONDUIT	55-213403G008

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WIRING DIAGRAM
FVNR SIZE 2, 3 & 4

AN #	THIRD ANGLE PROJECTION	SHEET #	DWG NO.	DATE	REV
09-9107		1 OF 1	55-179655	07/30/2009	14

Catalog #: CR408D698RB1AALAA

GE Digital Energy
Power Quality

Introduction

GE Surge Protective Devices (SPD) feature a compact and economical design for use at medium exposure, distribution or branch panels.

The Tranquell™ LE and ME Series are mounted in a NEMA 12 enclosure. An optional flushmount design and NEMA 4X enclosure are also available. Third-party tested per IEEE C62.62 and NEMA LS-1 for the rated 8x20µs surge current, per mode with fusing included. These units come standard with indicating lights and dry contacts. Ratings are available from 25kA – 100kA per mode, 50kA - 200kA per phase.

GE surge protective devices provide all mode protection, with surge components (MOVs) connected on the phase to neutral, phase to ground, and neutral to ground paths as appropriate for the voltage configuration.

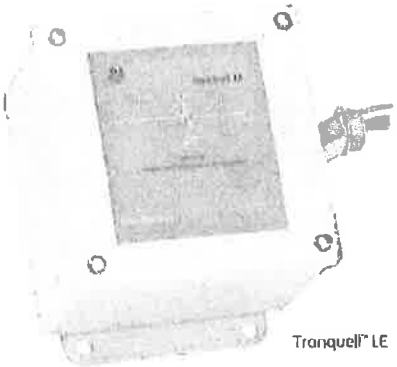
Features and Benefits

- > UL 1449 3rd Edition, Type 2
- > cUL, CSA C22.2
- > UL 96A, for use in lightning protection systems (ME Models Only)
- > UL 1283, Tranquell™ ME devices with EMI/RFI noise filter
- > Tranquell™ ME device tested to a minimum of 5,000 Category C3 impulses (10kA, 20kV) per mode
- > Tranquell™ ME device tested to a minimum of 5,000 Longwave (10x1000µs) impulses per mode
- > Tranquell™ LE device tested to a minimum of 3,500 category C3 impulses (10kA, 20kV) per mode
- > Thermal fuse technology
- > Form C dry contacts for remote monitoring
- > Green status indicating LEDs per phase
- > Standard heavy gauge painted steel NEMA 12 construction, available in surface or flushmount
- > Durable fiberglass construction for NEMA 4X
- > 5 year limited warranty (standard), 10 year limited warranty (optional)

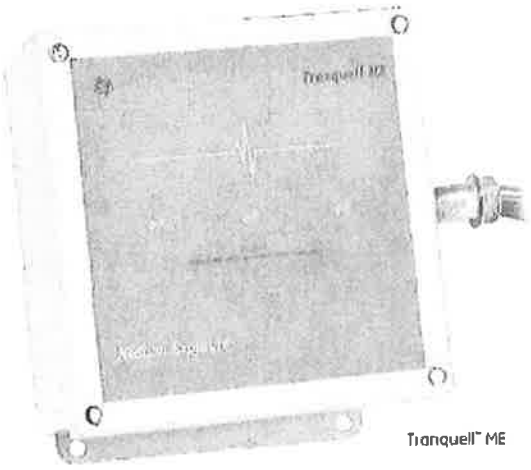
Wallmount

Tranquell™ LE & ME

Surface Protective Device (SPD)



Tranquell™ LE

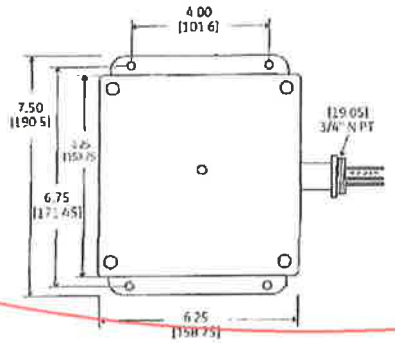


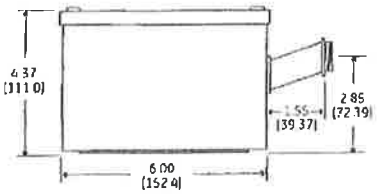
Tranquell™ ME

NEMA 12 Surfacemount Dimensions – WM Suffix

TLE

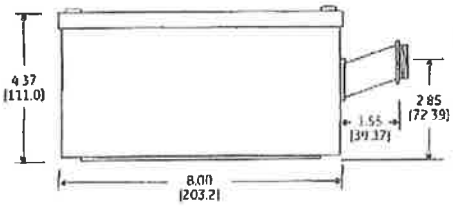
25, 50kA per mode

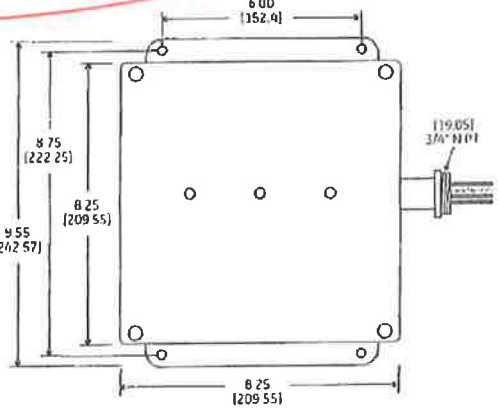




TME

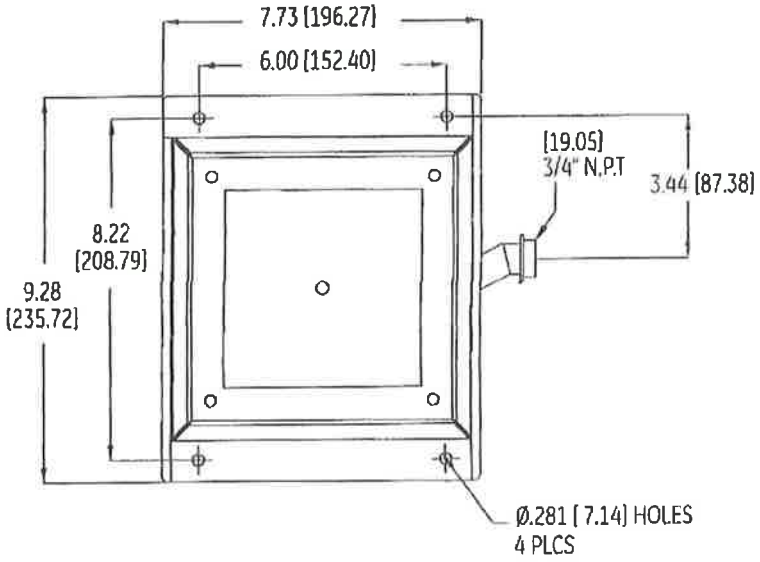
65, 80, 100kA per mode

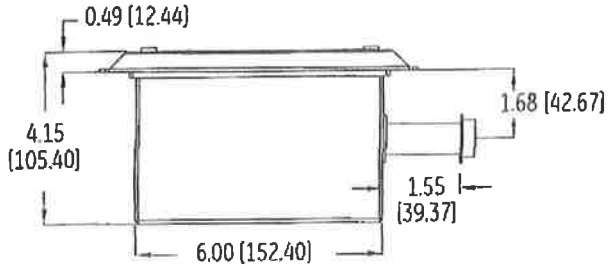




TLE Flushmount Dimensions – WMF Suffix

25, 50kA per mode



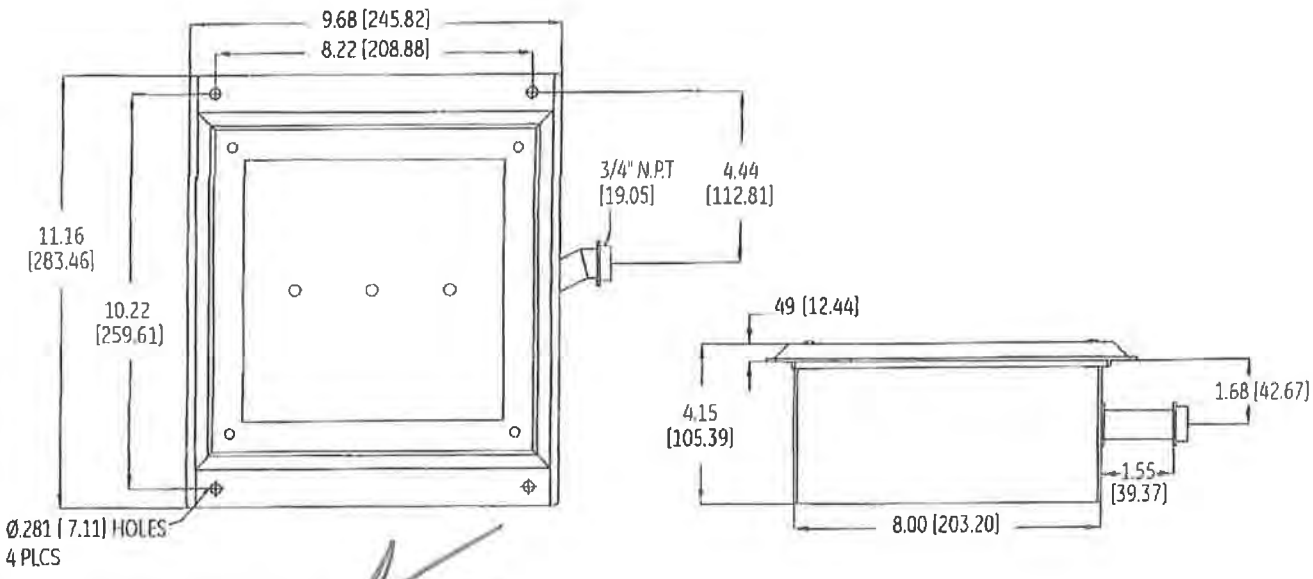


NOTE:
All dimensions are for reference only and are shown in inches [millimeters]

Refer to instruction manual for details

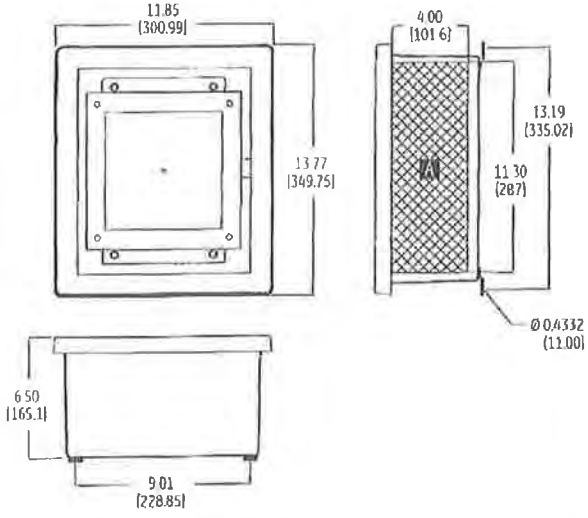
TME Flushmount Dimensions – WMF Suffix

65, 80, 100kA per mode



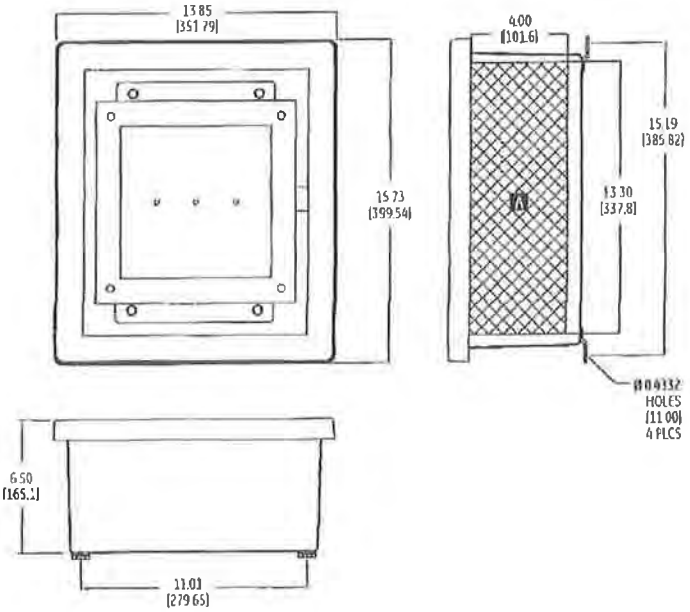
TLE NEMA 4X Dimensions – WM4 Suffix

25, 50kA per mode



TME NEMA 4X Dimensions – WM4 Suffix

65, 80, 100kA per mode



NOTE:
All dimensions are for reference only and are shown in inches [millimeters]

"A" = Recommended conduit entry areas

Refer to instruction manual for details

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GE Digital Energy - Power Quality
830 W 40th Street, Chicago, IL 60609 USA
800 637 1738 www.gepowerquality.com

Technical Specifications

Nominal Discharge Current (I_n)	TLE 10kA TME 20kA
Short Circuit Current Rating (SCCR)	65kA (30A breaker required)
Operating Frequency	50/60 Hz
Connection	10 AWG Conductors, Parallel Connected
Operating Temperature	-40° F to 149° F (-40° C to +65° C)
Operating Humidity	0% to 95% Non-Condensing
Weight	TLE 17 lbs. (7.7 kg) TME 21 lbs. (9.5 kg)

Catalog # TLE 120S 065 WM 4

		Nominal Voltage (Volts RMS)	System Voltage Configuration	MCOV Max. Continuous Operating Voltage L-N/G (Vrms)
TLE	120S	120/240	1 Ph, 3 W + G	150
TME	120Y	120Y/208	3 Ph, 4 W + G	150
	220Y	220/380	3 Ph, 4 W + G	320
	240D	240 Delta	3 Ph, 3 W	270
	240H	120/240 Delta HL	3 Ph, 4 W + G	150/270 HL
	240Y	240/415	3 Ph, 4 W + G	320
	277Y	277Y/480	3 Ph, 4 W + G	320
	480D	480 Delta	3 Ph, 3 W	550

	Exposure Level	Maximum Surge Current Capacity Per Mode	Per Phase
025	LE	25kA	50kA
050	LE	50kA	100kA
065	ME	65kA	130kA
080	ME	80kA	160kA
100	ME	100kA	200kA

Suffix*	Description	NEMA Enclosure	Mounting
	Painted Steel	12	Surface
F	Painted Steel	12	Flush
4	Fiberglass	4X	Surface

* All suffix features are mutually exclusive

c UL us

TLE Protection Ratings

Voltage Code	120S/120Y				240D		240H							220Y/240Y/277Y				480D	
Protection Mode	L-N	L-G	N-G	L-L	L-G	L-L	L-N	HL-N	L-G	HL-G	N-G	L-L	HL-L	L-N	L-G	N-G	L-L	L-G	L-L
UL 1449, 3rd Edition Voltage Protection Ratings (VPR) (assigned UL rating)	600	600	600	1000	900	1800	600	1200	600	1000	600	1000	1800	1200	1000	1200	1800	1800	4000
UL 1449, 2nd Edition Suppression Voltage Ratings (SVR) (assigned UL rating) *	500	500	500	–	800	–	500	800	500	800	500	–	–	800	800	800	–	1500	–

TME Protection Ratings

Voltage Code	120S/120Y				240D		240H							220Y/240Y/277Y				480D	
Protection Mode	L-N	L-G	N-G	L-L	L-G	L-L	L-N	HL-N	L-G	HL-G	N-G	L-L	HL-L	L-N	L-G	N-G	L-L	L-G	L-L
UL 1449 3rd Edition Voltage Protection Ratings (VPR) (assigned UL rating)	900	1000	900	1500	1500	2000	900	1500	1000	1500	900	1500	2500	1500	1500	1500	2500	1800	4000
UL 1449, 2nd Edition Suppression Voltage Ratings (SVR) (assigned UL rating) *	400	400	400	–	700	–	400	700	400	700	400	–	–	900	800	1500	–	1500	–

* NOTE: SVR Ratings are no longer assigned by UL and are included in the table above for reference purposes only


RONK
ADD A PHASE
STATIC PHASE CONVERTER
MAX HP
TYPE
FLA 10
MODEL
Hz 60
MIN KVA
SERIAL NO.
VOLTS: INPUT
OUTPUT
RONK
DANGER

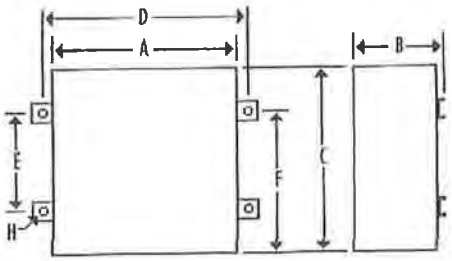
ADD-A-PHASE® POWER CONVERTER

091912

c UL US LISTED

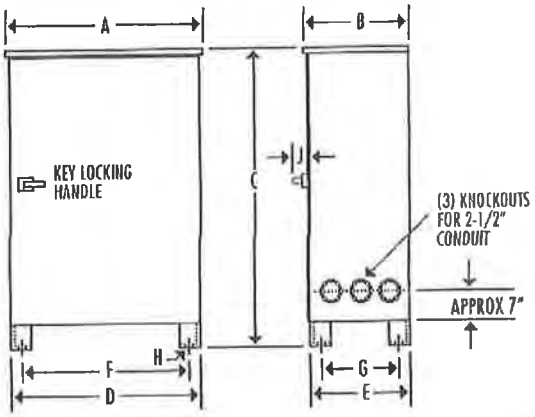
TYPE	TYPICAL APPLICATIONS (SINGLE MOTOR ONLY)
S	PUMP, COMPRESSOR, FAN, BLOWER
SAC	AIR CONDITIONING, REFRIGERATION COMPRESSOR
SUB	SUBMERSIBLE WATER PUMPS
HE-AA	HYDRAULIC PASSENGER ELEVATORS
AA-HE	HYDRAULIC COMPACTORS, BALERS
HD	SIREN, VALVE ACTUATOR

DIMENSIONS OF NEMA 3R ENCLOSURES



ENCLOSURE	A	B	C	D	E	F	H
603	17	11	16-1/8	18	10	13	1/2
107	22-1/4	12-7/8	18-5/8	26	11-1/2	15	9/16
115	25-1/2	14	21-1/4	29	14	17-1/2	9/16
130	28-3/4	16-1/2	26-3/4	32-1/4	17-5/8	22-1/8	9/16

PADMOUNT



ENCLOSURE	A	B	C	D	E	F	G	H	J
150	32	22-7/8	40-7/8	30	21	27-1/2	18-1/2	1/2	3-1/4
175	38	28-7/8	40-7/8	36	27	33-1/2	24-1/2	1/2	3-1/4

1Ø FULL LOAD AMP RATING

HP	INPUT VOLTAGE 240V	INPUT VOLTAGE 480V	STARTING CURRENT
1	5	3	
1.5	7	4	
2	9	6	APPROXIMATELY
3	13	7	300% OF
5	20	10	FULL LOAD
7.5	30	15	RUNNING
10	40	20	AMPS
15	60	30	
20	80	40	
25	95	48	
30	115	58	
40	150	75	
50	185	93	
60	220	110	
75	280	140	

FOR TYPE SAC & SUB, USE THE NEXT LARGER HP RATING

OTHER MODELS AVAILABLE. CONTACT RONK FOR MORE INFORMATION

ENCLOSURE SIZE & APPROXIMATE SHIPPING WEIGHTS (LBS)

ENCLOSURE	HP	2S	2SAC 2SUB	2HE-AA 2AA-HE	2HD	3S	3SAC 3SUB	3HE-AA 3AA-HE	3HD	4S	4SAC 4SUB	4HE-AA 4AA-HE	4HD
603	1	52	60		55	114	119		116	56	60		61
	1.5	60	63		85	119	127		121	60	63		85
	2	63	74		95	127	138		129	63	115		95
	3	74	140		112	138	160		158	115	142		110
107	5	140	165		145	160	190		180	142	165		145
	7.5	165	205		178	190	240		205	165	205		175
115	10	205	242	225	210	240	285	269	250	205	245	210	215
	15	242	310	275	280	285	380	319	315	245	320	250	285
130	20	310	350	328	320	380	400	373	390	320	360	330	330
	25	350	390	368	360	400	450	410	410	360	420	370	370
	30	390	555	400	497	450	635	545	550	420	574	498	525
150	40	555	626	565	565	635	720	640	645	574	660	585	590
	50	626	680			720	867			660	755		
175	60	680	700			867	975			755	892		
	75	700				975				892	1,115		
	100									1,115	1,125		
	125									1,125			

Sales Information: 1-800-221-7665

RONK ELECTRICAL INDUSTRIES, INC.

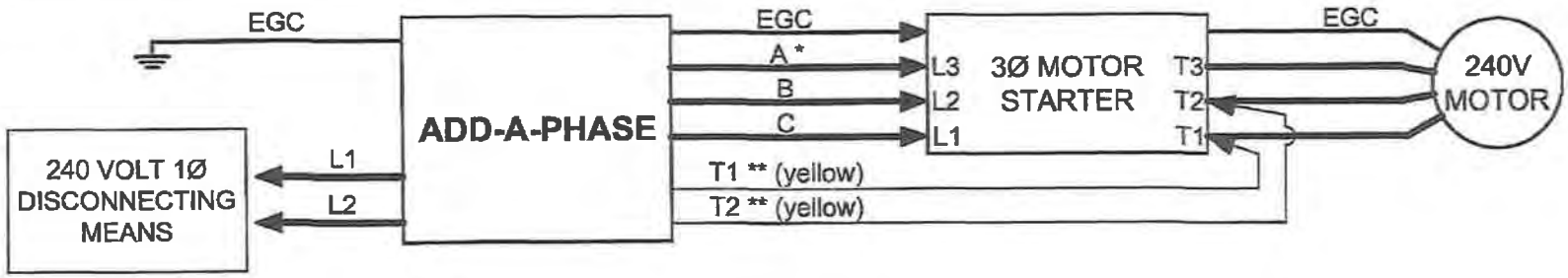
Service & Support: 1-217-563-8333

106 E. State Street • Nokomis, Illinois 62075 www.ronkelectrical.com Phone: 217-563-8333 • Fax: 217-563-8336

Power Leads

Control Leads

EGC = Equipment Grounding Conductor



* Do not connect control circuits or other single-phase loads to A phase (phase with highest voltage to ground) from the converter.

** VERIFY FIELD CONNECTION OF T1 AND T2 CONTROL LEADS:
Energize the circuit up to the motor starter. Do NOT turn on the starter. On the input side of the motor starter, measure the phase-to-phase and phase-to-ground voltages to verify the voltage on each pole. The T1 and T2 leads should be connected on the motor side of the starter on the two poles that measure 120 volts phase-to-ground.

CONNECTION CHECKLIST

Single-Phase to L1 & L2	✓

At 3Ø Motor Starter			
A to L3		EGC(s)	
B to L2		T2 to T2	
C to L1		T1 to T1	

VOLTAGE CHART

Location	Voltage Between	Motor Off - No Current	Motor On - Balanced 3Ø Currents
1Ø Input	L1 to L2	240 Volts +	240 Volts +
At 3Ø Magnetic Starter	L1 to L2 (C-B)	240 Volts +	240 Volts +
	L1 to L3 (C-A)	Approx. 440 Volts ++	Approx. 240 Volts
	L2 to L3 (B-A)	Approx. 200 Volts ++	Approx. 240 Volts
	L1 (C) to Ground	120 Volts	120 Volts
	L2 (B) to Ground	120 Volts	120 Volts
	L3 (A) to Ground	Approx. 320 Volts ++	Approx. 210 Volts

\+ Line voltage may vary from nominal 240 volts, other voltages will vary proportionally.

++ Motor off voltages on L1-L3 (C-A) and L2-L3 (B-A) depend on transormer tap setting. The values given are for factory TAP 4 setting. Higher tap setting will cause higher motor off voltages. **Regardless of tap setting, $V_{AB} + V_{BC} = V_{AC}$.**

WIRING

- Size A, B, and C leads according to Article 430 of NEC®.
- Size L1 and L2 for 125% MIN of the 1Ø FLA on the ADD-A-PHASE nameplate.
- Size EGC (see above) according to Article 250 of NEC.
- Size control leads - #16 MIN.
- See Article 455 of NEC for rules governing phase converter installations.

INTERCONNECTION DIAGRAM FOR ADD-A-PHASE®								TYPE 2S(...)	
REVISIONS								RONK ELECTRICAL INDUSTRIES, INC. NOKOMIS, ILLINOIS	
	DATE	BY			DATE	BY			
A				F					
B				G				DRAWN - NCL	DRWG. NO.
C				H				DATE - 2/20/08	2-5330-1
D				I				APP'D - PG	
E				J					

ADD-A-PHASE®
240 Volt Input – 240 Volt Output (TYPE 2S)

GETTING STARTED

Before installing the ADD-A-PHASE power converter, verify that the single-phase supply voltage matches the converter rating; 240 Volts, 60 Hz. Consult the converter nameplate for input voltage and amperage requirements.

The single-phase supply should be connected to the unit through a disconnecting means (a circuit breaker or fused disconnect switch), utilizing a time-delay type breaker or fuses. The ampere rating of the disconnecting means shall not be less than 115% of the single-phase ampere rating of the ADD-A-PHASE. A three pole across-the-line starter with appropriately sized overloads is highly recommended for proper motor operation and protection. All wiring should be done by a qualified electrician in accordance with all applicable electrical codes. See Article 455 of the NEC® (and other applicable Articles) for rules governing phase converter installations.

The following connections need to be made (**see diagram on reverse side for more details**).

- Equipment ground(s):
  - All equipment must be properly grounded. See Article 250 of the NEC for proper grounding and bonding.
- Input: (L1, L2)
  - Connect incoming single-phase service to L1 and L2.
- Motor Starter: (C, B, A) and (T1, T2)
  - Connect the power leads C to L1, B to L2, and A to L3 on the **line** side of the starter.
  - Connect the control leads T1 to T1 and T2 to T2 on the **load** side of the starter (with the motor leads).

Do not connect starter coils, control transformers, or single-phase loads to "A" phase (manufactured phase) from the converter. "A" phase may only be used to power the three-phase motors.

STARTING THE MOTORS

Close the single-phase disconnecting means, applying voltage to the ADD-A-PHASE. Measure and record the voltages on the line side of the motor starter. The measured voltages should match the Voltage Chart on the reverse side of this page. Label the phase conductors "C", "B", and "A" as defined by these voltage measurements. Proper identification of the phases is necessary. You should now be ready to start the motor. Refer to the manual for component descriptions.

When starting the motor, observe the following sequence of events.

1) The motor is energized.
2) The ADD-A-PHASE auxiliary relay should energize immediately and remain closed.
3) The ADD-A-PHASE start contactor should engage.
4) The motor should accelerate to full speed within 1 to 3 seconds.
5) The start contactor will drop out and motor will continue running.

IF THE MOTOR DOES NOT REACH FULL SPEED WITHIN 10 SECONDS, SHUT OFF POWER TO STARTER. Place a voltmeter across T1 and T2 of the starter and reenergize the starter long enough to read this voltage. The indicated phase-to-phase voltage on T1-T2 must be above 220 volts for the motor to start properly. If the voltage is adequate and the motor does not start, refer to the Troubleshooting Chart in the manual. DO NOT ALLOW THE START CONTACTOR TO REMAIN CLOSED FOR MORE THAN 10 SECONDS – LONGER PERIODS CAN DAMAGE THE START CAPACITORS OR OTHER EQUIPMENT!

BALANCING CURRENTS

In order to use these balancing procedures, the "C", "B", and "A" phases must be properly identified. Phase identification can be verified by measuring the motor off voltages on the line side of the motor starter. With "X" connected on tap 2 or above, "A" will always have the highest phase-to-ground voltage, and "A to C" will always have the highest phase-to-phase voltage. "X" is for adjusting the tap setting on the ADD-A-PHASE autotransformer.

The three motor currents ("C", "B", and "A") should be checked with a clamp-on ammeter and balanced if necessary. The motor must be under normal operating load when taking the readings. To balance the currents, follow these procedures.

1) Identify the phases at the motor starter as stated above. Then measure the three running amperages on the motor leads.
2) If closer balance is desired, shut off and lock out the single-phase disconnecting means for the converter. Discharge all capacitors before beginning to adjust the unit for better current balance.
3) If "A" current is considerably higher than "C", a light load condition is indicated. If "A" is near FLA and "B" and "C" currents are higher, an overload condition is indicated. If either of these conditions exists, verify load is correct before proceeding with balancing.
4) If "A" is high with "C" low and you have verified the motor is lightly loaded, disconnect some capacitance to bring "A" down and "C" up. If "B" amperage remains higher than both "A" and "C", it may be necessary to move "X" down to a lower tap of the autotransformer.
   Note: Moving to a lower (higher) tap will decrease (increase) "A" phase voltages thereby decreasing (increasing) "A" phase current. Capacitance may need to be connected (disconnected) to readjust "A" phase current.
5) If "A" is lower than "B" and "C", more capacitance needs to be connected.
6) If "B" is lower than "C", then "X" needs to be moved to a higher tap.
7) For future reference, record the final phase-to-phase voltages, phase currents, and motor off voltages.

If you have any questions about these procedures or need assistance with balancing, call RONK at (217) 563-8333.

ADD-A-PHASE®

USER MANUAL

The Ronk ADD-A-PHASE is the finest static phase converter available. The design allows adjustment to provide balanced three-phase power at any motor load point up to the converter's rating. The high operating efficiency and low standby losses make the ADD-A-PHASE ideal in most automated applications.

Balanced three-phase power is dependent on both the converter and the motor. When no current is drawn by the load (motor off), voltages will not be balanced. When the motor is energized, the third phase current is supplied by capacitors at an appropriate phase angle. When the motor reaches full speed, a portion of the capacitance is automatically switched out of the circuit, and running current is provided by the transformer and oil capacitors. Changing capacitance will change the magnitude of manufactured phase current. Changing transformer tap will change the phase angle. The ADD-A-PHASE is the only static converter which provides these two degrees of freedom to balance currents.

The converter is specified by horsepower and type designation. The horsepower rating indicates the maximum total load which may be operated by the converter. The number and letters of the type are coded as follows:

Example: 10 HP 2 SUB

2	– 240V in, 240V out	S	– standard converter
3	– 240/480V in, 480V out	SUB	– for deep well submersible pump motors
4	– 480V in, 480V out	SAC	– for refrigeration & air conditioning
5	– 240/575V in, 575V out	K	– DUO ADD-A-PHASE
6	– 575V in, 575V out	L	– TRIO ADD-A-PHASE

Suffixes may be added to this designation to indicate factory modifications.
(i.e. -8 → 208 volt output)

INSTALLATION

The ADD-A-PHASE should be installed by a competent electrician in accordance with good wiring practice and applicable electrical codes. The converter should be mounted in an upright position, preferably near the magnetic starter for the motor, and fastened securely to a firm support. Large horsepower units are supplied in a floor mount enclosure, and should be placed on a concrete pad or floor. Standard enclosures are designed for outdoor mounting, but protection from weather and direct sunlight can prolong the life of the unit. The wiring diagram and installation instructions provided with the converter must be followed to provide satisfactory operation.

The manufactured phase on a Ronk converter is identified as "A". Motor control circuits and single-phase loads must not be connected to this phase. When installing DUO ADD-A-PHASE or special multiple models, the "A" lead for each motor must be kept isolated from other leads.

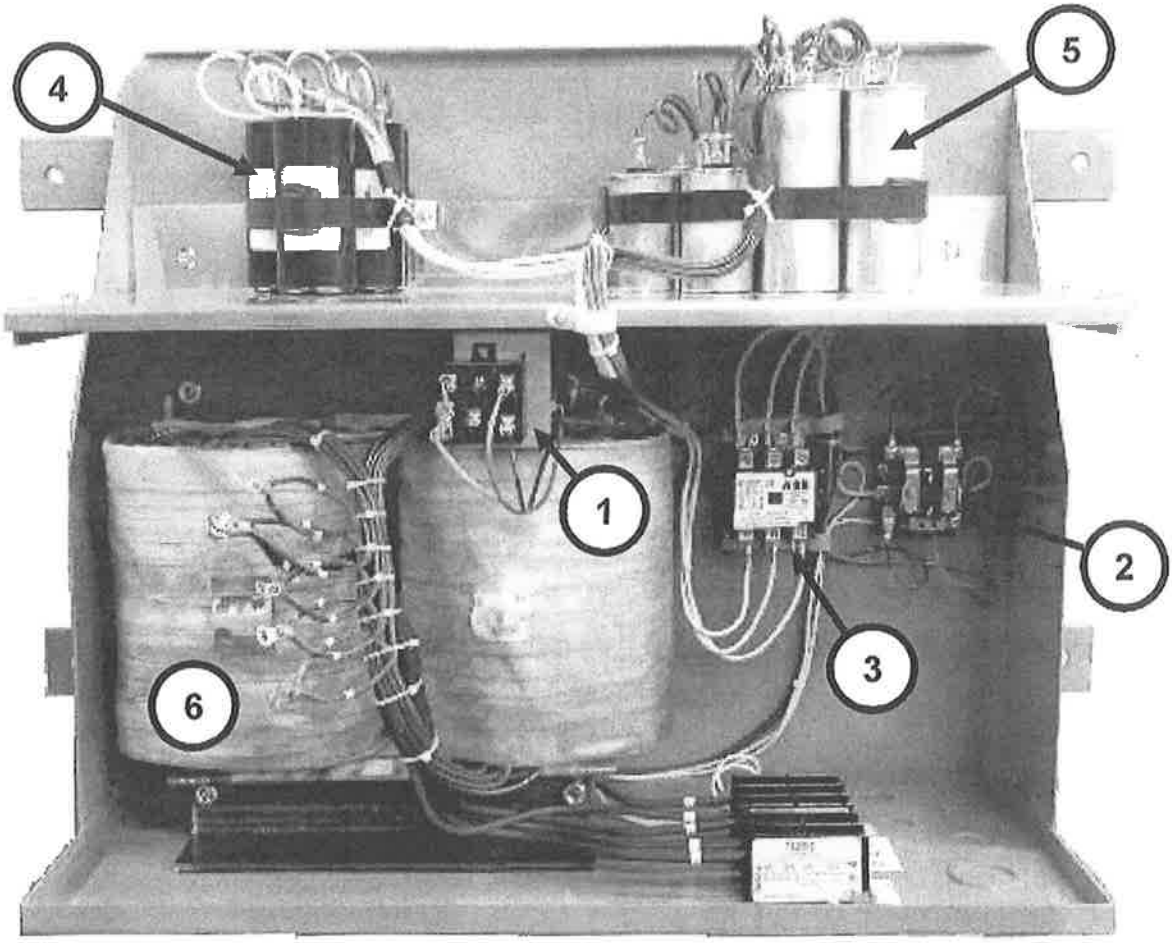
The two additional control leads (for each motor) used with standard converters must be connected to the load side of the magnetic starter and phased as shown on the wiring diagram. Some applications involve additional contactors controlling the motor -- the control leads must be connected to the load side of the last controlling device. In reversing applications, the reversing contactor should switch the two phases to which the control leads are connected.

The procedures on the connecting instructions supplied with the converter should be followed for initial checkout and balancing. A motor smaller than the converter's horsepower rating may be operated, but the converter should be modified by disconnecting a proportional amount of starting and running capacitors. Consult our Service Dept. for assistance. Loads larger than the converter's rating should not be operated.

CONVERTER OPERATION

In normal applications, the ADD-A-PHASE is energized continuously by the single-phase input voltage. Standby losses are very low. Since no current is present in the capacitors, no voltage or phase shift is present on the capacitors and the output voltages reflect only the voltages across the transformer windings (see Interconnection Diagram for more information).

Two relays and a normally open contactor are used to switch start capacitance. When the motor is energized, the auxiliary relay closes and the start contactor closes. Both banks of capacitors deliver starting current in the "A" phase. As the motor reaches full speed (typically 1-3 seconds), voltage feedback from the motor is sensed by the control relay, opening its contacts. This drops out, or opens, the start contactor, removing start capacitance from the power circuit. The motor continues to run with "A" phase current supplied by the run (oil) capacitors and transformer. When the motor is turned off, the auxiliary relay opens and the control relay resets.



1. CONTROL RELAY – This relay controls the duration of time that the start contactor remains energized. Its N/C contact opens when the motor reaches full speed and closes when the auxiliary relay opens. This relay may employ one or more resistors in series with the coil.

2. AUXILIARY RELAY – This relay de-energizes the starting control circuits when the motor is off. Its contacts close when the motor is energized and open when the motor is de-energized.

3. START CONTACTOR – This contactor closes to add start capacitance to provide starting current to the motor. Its contacts close when the motor is energized and open when the motor reaches full speed. The coil is controlled by the auxiliary and control relays.

4. START CAPACITORS – These capacitors provide the high currents on the "A" phase required to start an induction motor. Start capacitors are connected in parallel with red and yellow wires, and may be connected in series-parallel in high voltage converters. The wiring diagram should be consulted for proper wiring pattern.

   Electrolytic capacitors are generally employed as starting capacitors. These provide large capacitance in compact components and are suitable for intermittent use. The case of this capacitor type is normally round plastic.

   Oil capacitors are employed in special models for frequent or long duration starting duty.

5. RUN (OIL) CAPACITORS – These capacitors provide the necessary running current on the "A" phase. This current is proportional to the amount of capacitance connected -- disconnecting run capacitors will reduce "A" amperage. Run capacitors are connected in parallel with blue and black leads, and may be connected series-parallel in high voltage converters. The wiring diagram should be consulted for proper wiring pattern.

   Oil capacitors are generally supplied in sealed metal cans. All oil capacitors are UL listed, non-PCB devices, and rarely fail in normal service.

6. AUTOTRANSFORMER – The conservative design of this component provides many years of trouble-free service. Its function is to allow adjustment of "A" current to the proper phase angle, depending on the power factor of the load. Adjustment is performed by bolt connection of lead "X" to the appropriate numbered tap at the front of the transformer.

TROUBLESHOOTING

For proper converter operation, the start contactor in any ADD-A-PHASE must engage during motor acceleration and disengage when the motor reaches full speed. Proper connection of the auxiliary relay coil leads (T1 and T2 terminal block) to the load side of the motor starter is mandatory. The auxiliary relay must close and remain closed (not chatter) whenever the motor is energized and open whenever the motor is off. If the relay does not perform properly, the most likely cause is misconnection of the auxiliary relay coil leads. See the Interconnection Diagram for connecting instructions.

Operating voltage will significantly affect operation of the start circuit. If higher than normal starting voltage is encountered, the start contactor may chatter. The chatter may be eliminated by reducing the connected start capacitance. If the 1Ø voltage is higher than +10% of nominal, notify the power company. Damage to equipment may result. Low starting voltage on the single-phase line may prevent the motor from accelerating to full speed. If the 1Ø voltage drops -10% nominal during start, the motor may not be able to draw sufficient power from the single phase service to accelerate. Lights dimming and/or chattering of control circuits may be observed. This problem must be identified and corrected for proper operation.

CAPACITOR CHECKING PROCEDURES:

Before proceeding with any checks on the capacitors, make sure the single-phase power is locked off and all capacitors are adequately discharged.

- Check capacitors individually.
- At least one side of the capacitor to be checked must be disconnected from the circuit.

Capacitors are easily checked with a digital multimeter that has a capacitance setting. The symbol will look like "--|(--" and is usually located near the ohms "Ω". If you have the manual for your meter, look for "Capacitance" in the Index. Compare measured MFD (μF) with the rating stamped on the capacitor.

Capacitors can also be checked in the field with an analog ohmmeter that has X100 and X1000 scales. Follow the steps below.

1. For oil capacitor checks, select the X1000 scale on the ohmmeter.
   For start capacitors, use the X100 scale.
2. Connect the two ohmmeter leads to the two capacitor terminals.
3. Capacitor okay: Ohmmeter swings to zero "0" and slowly floats back to an infinity reading (∞) after several seconds.
4. Capacitor shorted: Ohmmeter reads "0" or very low ohm value and does not move after several seconds.
5. Capacitor open: Ohmmeter does not move, stays on infinity (∞) reading.
   Switch ohmmeter leads and observe readings, should be the same.

TROUBLESHOOTING CHART

		POSSIBLE CAUSE OF TROUBLE																					
	TYPE OF TROUBLE	Shorted "A" phase	Open "A" phase	Shorted "B" or "C" phase	Open "B" or "C" phase	Open 1Ø fuse or power lead	Low 1Ø voltage	High 1Ø voltage	Motor control circuit misconnected or open	Auxiliary relay leads misconnected or open	Control relay N.C. contacts open	Open coil on start contactor	Open coil on control relay	Open coil on auxiliary relay	Shorted run capacitor	Open run capacitor	Bad start capacitor	Insufficient start capacitance	Excess start capacitance	Motor load increased	Motor load decreased	Insufficient run capacitance	Excess run capacitance
STARTING PROBLEMS	Motor starter won't engage				●	●	●		●														
	No voltage on "A" phase	●	●												●								
	Blows fuses immediately			●																			
	No or low amps on "A" phase		●							●					●	●							
	No or low amps on "B" or "C" phase				●	●																	
	Auxiliary relay won't engage				●	●	●			●				●									
	Start contactor won't engage		●		●	●	●	●		●	●	●		●									
	Auxiliary relay chatters						●		●	●													
	Start contactor chatters						●	●	●	●						●			●				
	Start contactor won't disengage	●					●						●		●		●	●					
RUNNING PROBLEMS	"A" phase amps lower than "B" & "C"						●									●				●		●	
	"C" phase amps lower than "A" & "B"							●													●		●

INFORMATION REQUIRED WHEN ORDERING REPLACEMENT PARTS

A file is kept on each of the ADD-A-PHASE converters manufactured. Therefore, to order replacement parts always advise Ronk of the serial number, type, and model of the unit. This information is located on the nameplate that is riveted to the cover of every unit. Also, list any information that is available from the part in question or identify it from the wiring diagram. Identical parts or satisfactory replacements are always available for any ADD-A-PHASE regardless of age, though some wiring modifications may be required to install.

APPENDIX E

APPENDIX E

2475N5 Series 80 gal. 5HP 2-Stage Stationary Electric Air Compressor (230 V 1-phase)

DIMENSIONS

Assembled Depth (in.)	48 in	Assembled Width (in.)	40 in
Assembled Height (in.)	76 in		

DETAILS

Air Delivery SCFM @ 40PSI	17.8	Maximum Pressure (psi)	175
Air Delivery SCFM @ 90PSI	17.2	Portable	No
Amperage (amps)	28	Power Source	Electric

2475N5 Series 80 gal. 5HP 2-Stage Stationary Electric Air Compressor (230 V 1-phase)

Application Use	Blow Cleaning,Bolting/Wrenching,Brad Nailing/Stapling,Cutting,Drilling,Finish Nailing,Framing Nailing,Grinding,Hobby Nailing,Inflation,Sanding,Spraying,Surface Prep	Product Weight (lb.)	597 lb
Compressor Tank Capacity (Gallons)	80	Reconditioned	No
Compressor Type	Workshop and Industrial	Returnable	90-Day
Compressor/Air Tool Features	Tank Pressure Gauge	Stage Count	Dual Stage
Decibel Rating (Outdoor)	85 dBA	Tank Material	Steel
Horsepower (hp)	5	Tank Style	Vertical
Included	No additional components or accessories are included	Tools Product Type	Air Compressor
Lubrication Type	Oil-Lubricated	Voltage (volts)	230

WARRANTY / CERTIFICATIONS

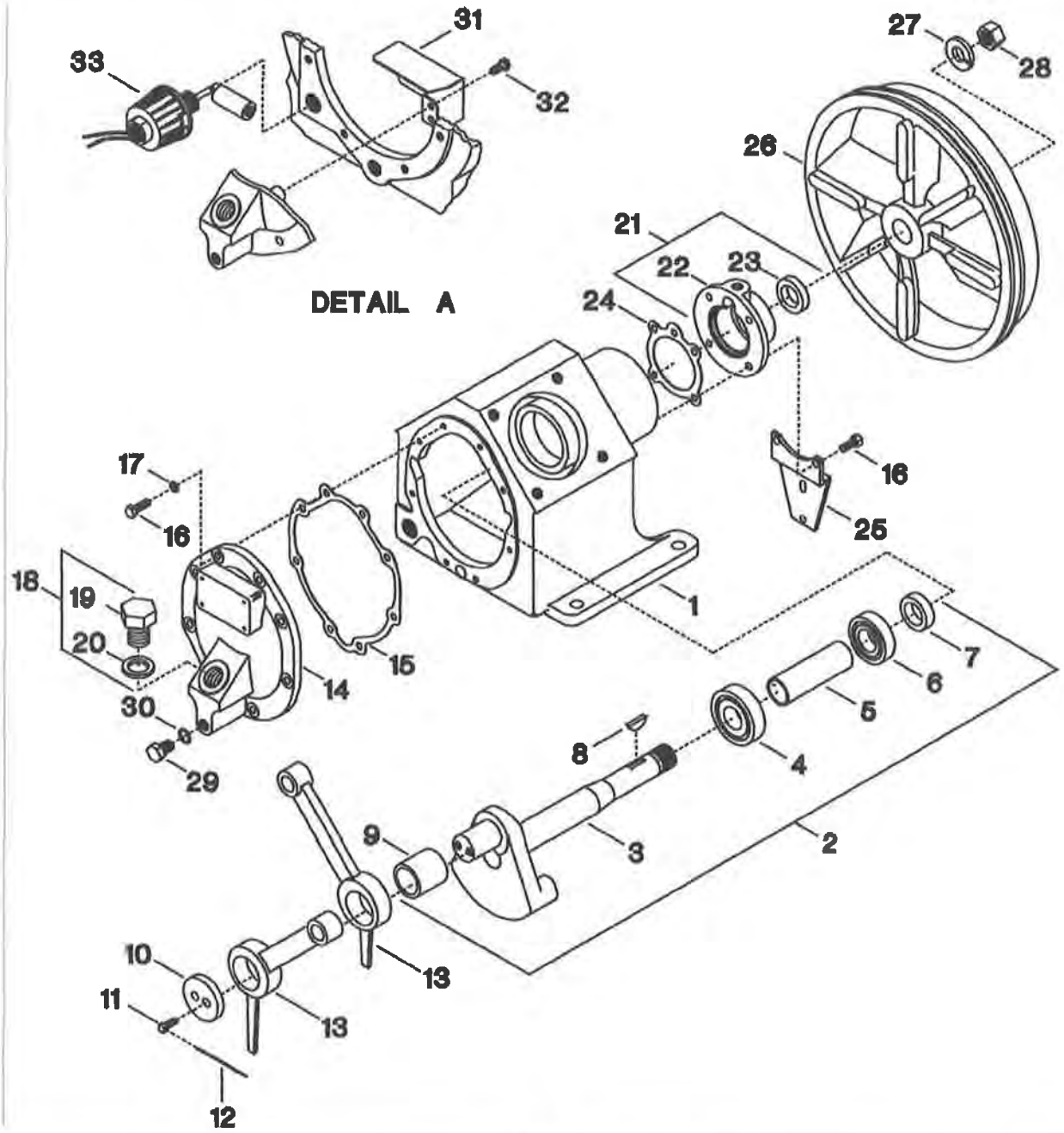
Certifications and Listings	CSA Listed	Manufacturer Warranty	1 year or 2 years with use of Ingersoll Rand All Season Select Synthetic Lubricant

Ingersoll-Rand®

2475
Air Compressor
Parts List

C.C.N : 22400394
REV. : A
DATE : JANUARY 2004

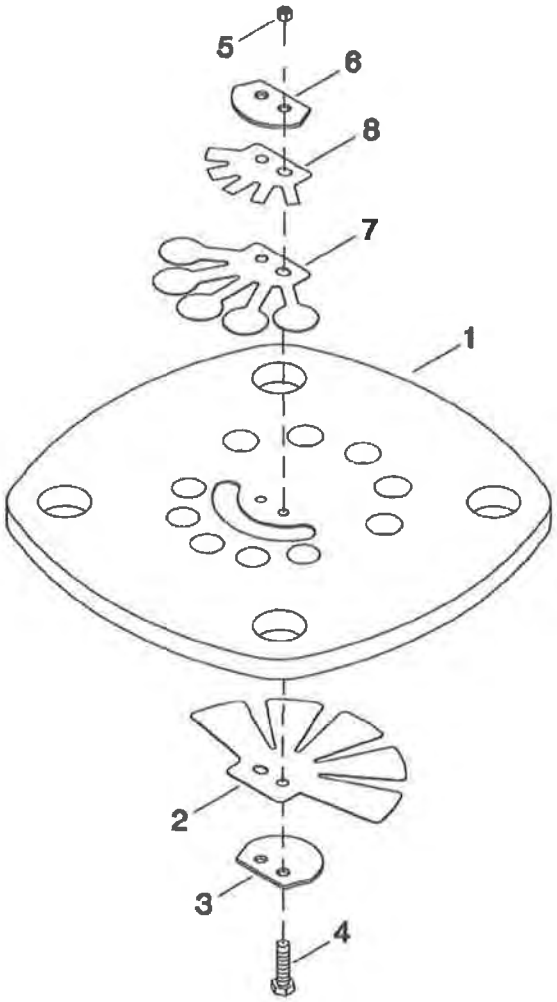
FIGURE 1. COMPRESSOR FRAME ASSEMBLY.



ITEM	CCN	DESCRIPTION	QTY
1-1	32247728	FRAME, COMPRESSOR	1
1-2	32496507	ASSEMBLY, CRANKSHAFT COMPLETE	1
1-3	NSS	• *CRANKSHAFT*	1
1-4	32248122	• BEARING, BALL	1
1-5	32006496	• SPACER, CRANKSHAFT BEARING	1
1-6	95134185	• BEARING, BALL WITH SNAP RING	1
1-7	37127669	• RING, BEARING RETAINER	1
1-8	95433173	• KEY, WOODRUFF	1
1-9	30210199	• BUSHING, CRANKPIN	1
1-27	95081808	• LOCKWASHER, SPRING - 3/4"	1
1-28	95076816	• NUT, HEX	1
1-10	30210298	CAP, CRANKPIN	1
1-11	95101911	CAPSCREW	2
1-12	37605193	LOCKWIRE	1
1-13	32004152	ROD, CONNECTING	2
1-14	32496663	COVER, FRAME END	1
1-15	32247884	GASKET, FRAME END COVER	1

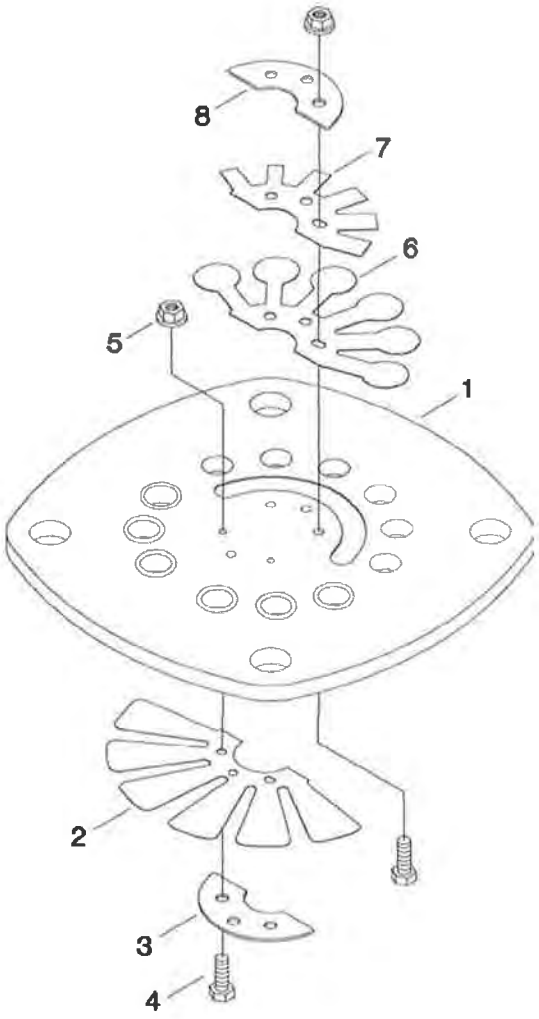
ITEM	CCN	DESCRIPTION	QTY
1-16	95105250	CAPSCREW, HEX - 5/16-18 X 1"	12
1-17	95674651	GASKET, COPPER WASHER - 5/16"	8
1-18	32279549	*PLUG, OIL FILLER - COMPLETE*	1
1-19	NSS	PLUG, OIL FILLER	1
1-20	32247850	O-RING, OIL FILLER PLUG	1
1-21	97331060	ASSEMBLY, SHAFT END COVER	1
1-22	NSS	L COVER, SHAFT END	1
1-23	32499923	L SEAL	1
1-24	32247876	GASKET, SHAFT END COVER	1
1-25	32157349	BRACKET, INTERCOOLER CLAMP	1
1-26	32496432	BELTWHEEL ELECTRIC MOTOR DRIVE	1
1-26	32496424	BELTWHEELGASOLINE ENGINE DRIVE	1
1-29	95053526	CAPSCREW, HEX - 1/2-13 X 3/4"	1
1-30	95674701	GASKET, COPPER	1
1-31	32295222	BAFFLE, OIL LEVEL SWITCH	1
1-32	95053070	CAPSCREW	2
1-33	22102388	KIT, LOW OIL LEVEL SWITCH	1

FIGURE 2. HIGH PRESSURE VALVE PLATE ASSEMBLY.



ITEM	CCN	DESCRIPTION	QTY
REF.	32310799	ASSEMBLY, VALVE PLATE - HIGH PRESSURE	1
2-1	NSS	PLATE, VALVE - HIGH PRESSURE	1
2-2	32236671	VALVE, FINGER - INLET	1
2-3	32297343	RETAINER, VALVE HP	1
2-4	97511042	SCREW, HEX HEAD - M3 X 16	2
2-5	97511059	NUT, HEX - M3 WITH LOCKWASHER	2
2-6	32295461	RETAINER, FINGER VALVE - DISCHARGE	1
2-7	32241010	VALVE, FINGER - DISCHARGE	1
2-8	32295479	VALVE, DAMPER - DISCHARGE	1

FIGURE 3. LOW PRESSURE VALVE PLATE ASSEMBLY.



ITEM	CCN	DESCRIPTION	QTY
REF.	32248205	ASSEMBLY, VALVE PLATE	1
3-1	NSS	PLATE, VALVE - LOW PRESSURE	1
3-2	32248130	VALVE, FINGER - INLET	1
3-3	32248148	RETAINER, FINGER VALVE - INLET	1
3-4	32247512	SCREW, HEX HEAD - M4 X 12	6
3-5	32248171	NUT, HEX - M4 WITH LOCKWASHER	6
3-6	32248155	VALVE, FINGER - DISCHARGE	1
3-7	32294464	VALVE, DAMPER - DISCHARGE	1
3-8	32248163	VALVE, RETAINER - DISCHARGE	1

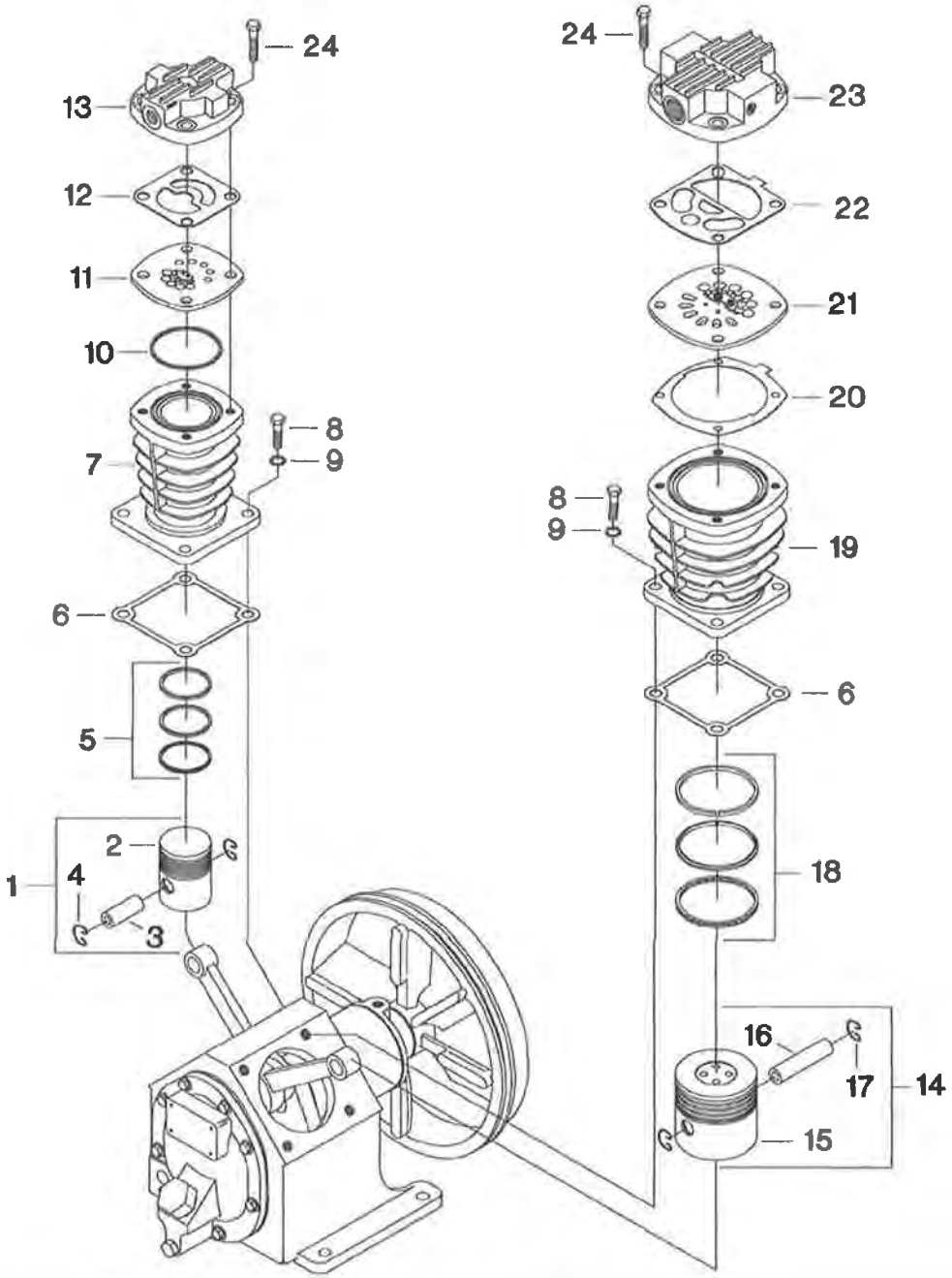
FASTENER TORQUE REQUIREMENTS FOR BARE COMPRESSOR PUMP

Torque values for critical nut, bolt, and capscrew fasteners are listed below.

Gradually and evenly in two stages, tighten each fastener to the final torque using a criss-cross tightening sequence. Use only calibrated torque wrenches.

THREADED FASTENER LOCATION	TORQUE
HIGH PRESSURE HEAD BOLT	75
LOW PRESSURE HEAD BOLT	75
CYLINDER FLANGE	50
FRAME END COVER	17
SHAFT END COVER	17
CRANKPIN CAP	11
HIGH PRESSURE VALVE - IN	11-15 IN LB
LOW PRESSURE VALVE - IN	25-30 IN LB
HIGH PRESSURE VALVE - OUT	11-15 IN LB
LOW PRESSURE VALVE - OUT	25-30 IN LB
BELTWHEEL	60

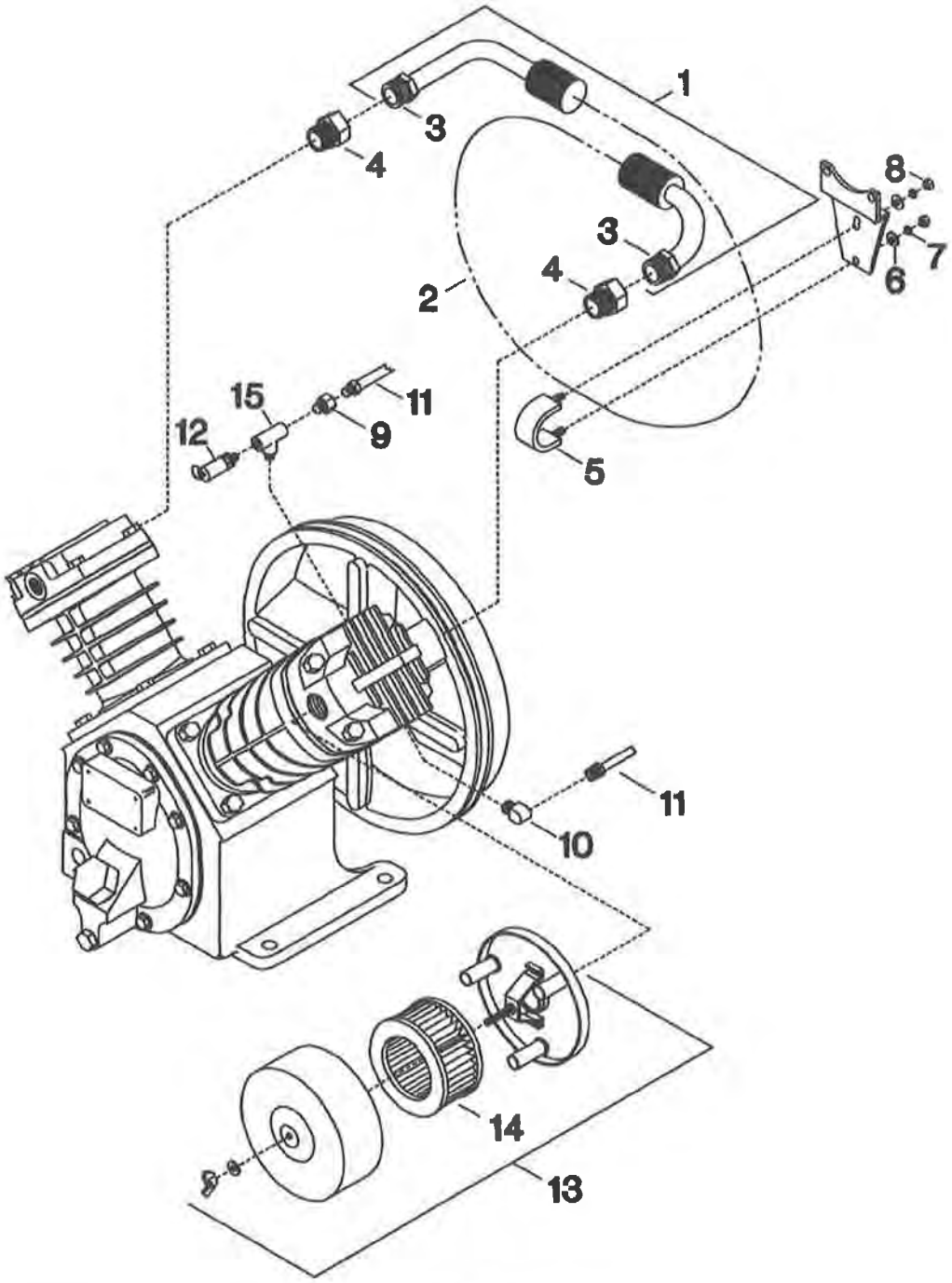
FIGURE 4. MODEL 2475 BARE COMPRESSOR PUMP.



ITEM	CCN	DESCRIPTION	QTY
4-1	32496598	PISTON, AIR - COMPLETE - 2.5" HIGH PRESSURE	1
4-2	NSS	PISTON - AIR - 2 5"	1
4-3	30287783	PIN, PISTON	1
4-4	30298020	RING, LOCK	2
4-5	32307910	SET, PISTON RING - 2.5"	1
4-6	32247868	GASKET, CYLINDER/FLANGE	2
4-7	32247652	CYLINDER - 2.5" - HIGH PRESSURE	1
4-8	95053567	CAPSCREW, HEX - 1/2-13 X 1-1/4"	8
4-9	95674701	GASKET, COPPER - 1/2"	8
4-10	32246878	O-RING, VALVE PLATE - HIGH PRESSURE	1
4-11	32310799	ASSEMBLY, VALVE PLATE - HIGH PRESSURE (SEE FIGURE 2)	1
4-12	32247926	GASKET, AIRHEAD - HIGH PRESSURE	1

ITEM	CCN	DESCRIPTION	QTY
4-13	32247827	AIRHEAD - HIGH PRESSURE	1
4-14	32496564	PISTON, AIR - COMPLETE - 4" - LOW PRESSURE	1
4-15	NSS	PISTON, AIR - 4"	1
4-16	30288393	PIN, PISTON	1
4-17	30298020	RING, LOCK	2
4-18	32307928	SET, PISTON RING - 4"	1
4-19	32293540	CYLINDER, - 4" LOW PRESSURE	1
4-20	32248197	GASKET, VALVE PLATE - LOW PRESSURE	1
4-21	32248205	ASSEMBLY, VALVE PLATE - LOW PRESSURE (SEE FIGURE 3)	1
4-22	32248189	GASKET, AIRHEAD - LOW PRESSURE	1
4-23	32293557	AIRHEAD - LOW PRESSURE	1
4-24	95104188	CAPSCREW, HEX - 1/2-13 X 1-3/4"	8

FIGURE 5. TYPICAL MODEL 2475 INTERCOOLER ASSEMBLY.



ITEM	CCN	DESCRIPTION	QTY
5-1	32499196	ASSEMBLY, INTERCOOLER	1
5-2	NSS	• INTERCOOLER	1
5-3	95108577	• NUT, TUBE - 3/4"	2
5-4	95083275	CONNECTOR, TUBE	2
5-5	32247942	CLAMP, INTERCOOLER	1
5-6	95094298	WASHER, FLAT - 1/4"	2
5-7	95648150	*LOCKWASHER, SPRING - 1/4"*	2
5-8	95416335	NUT, HEX - 1/4-20	2
5-9	95082483	CONNECTOR, TUBE	1
5-10	95031860	ELBOW, TUBE	1

ITEM	CCN	DESCRIPTION	QTY
5-11	32247892	ASSEMBLY, TUBE - BREATHER	1
5-12	72062185	VALVE, RELIEF - 80 PSIG	1
5-13	32170953	FILTER, INLET - COMPLETE - 10 MICRON	1
5-14	32170979	ELEMENT, FILTER - 10 MICRON	1
5-13	37170834	FILTER, INLET - COMPLETE - 4 *MICRON*	
5-14	32165466	ELEMENT, FILTER - 4 MICRON	
5-15	37143542	ELBOW, STREET	1

NO 3 PHASE

SIMPLEX ELECTRIC MOTOR MODELS

AIR COMPRESSOR PUMP

CCN	DESCRIPTION	QTY
	AIR COMPRESSOR PUMP GROUP	1
32304370	PUMP, BARE COMPRESSOR	1
95114476	CAPSCREW, HEX - 1/2-13 X 1-1/2 (TO MOUNT PUMP TO BASE)	4
95458808	NIPPLE, CLOSE 3/4 X 1-3/8	1
95716890	LOCKWASHER, SPRING - 1/2 (FOR PUMP MOUNTING CAPSCREWS)	4

CONTROLS

CCN	DESCRIPTION	QTY
	COMMON	
31385693	VALVE, SAFETY / RELIEF - 200 PSIG	1
32174286	VALVE, SAFETY / RELIEF (DISCHARGE) - 325 PSIG	1
32499816	GAUGE, AIR PRESSURE - 0-300 PSIG, 1/4 NPT, 9 O'CLOCK	1
32179038	PLUG, PIPE - 1/4	1
	CENTER DISCHARGE UNITS	
56288772	SWITCH, PRESSURE - SIEMENS W / UNLOADER VALVE & LEVER	1
32333072	ASSEMBLY, TUBE - PRESSURE SWITCH TO CHECK VALVE	1
32499626	ASSEMBLY, DISCHARGE TUBE	1
85582229	VALVE, CHECK - 5/8 T X 3/4 NPT	1
32145088	ELBOW, TUBE - 3/4 X 3/4 WITH PORT	1
95031795	TUBE ELBOW - 5/8 X 1/2	1
95426714	NIPPLE, CLOSE - 1/4 X 7/8	1
	FULLY PACKAGED UNITS	
56288764	SWITCH, PRESSURE - SIEMENS W / UNLOADER VALVE (FULLY PACKAGED UNITS)	1
32221228	TEE, MALE BRANCH -1/4	1
32322281	ASSEMBLY, TUBE - PRESSURE SWITCH TO CHECK VALVE 2475N NEMA 1 IFCV	1
32322299	ASSEMBLY, TUBE - PRESSURE SWITCH TO CHECK VALVE 2475D NEMA 1 IFCV	1
32323172	ASSEMBLY, TUBE - UNL 2475N7.5 PRESS SW TO CK VLV W/ROT SWITC	11
32323396	ASSEMBLY, TUBE - MM/CK VLV/ACA C 2475N (INV CK VLV)	1
32323404	ASSEMBLY, TUBE - N4 PS/CK VLV 2475D (INV CK VLV)	1
32323412	ASSEMBLY, TUBE - MM/CK VLV/TEB G 2475N	1
32333098	ASSEMBLY, TUBE - PRESSURE SWITCH TO CHECK VALVE 2475N (SIEMENS)	1
32333106	ASSEMBLY, TUBE - PRESSURE SWITCH TO CHECK VALVE 2475D (SIEMENS)	1
32333114	ASSEMBLY, TUBE - PRESSURE SWITCH TO CHECK VALVE 2475N7.5 (SIEMENS)	1
32334849	ASSEMBLY, TUBE - PRESSURE SWITCH TO CHECK VALVE 2475N5	1
32334872	ASSEMBLY, TUBE - PRESSURE SWITCH TO CHECK VALVE 2475N7.5	1
32334880	ASSEMBLY, TUBE - PRESSURE SWITCH TO CHECK VALVE 2475D5	1
32209157	NIPPLE, LONG - 1/4 X 5	1
95082467	CONNECTOR, MALE - 1/4 X 1/4	1

AIR RECEIVER TANK

CCN	DESCRIPTION	QTY
97336259	TANK, AIR RECEIVER - 80 GALLON VERTICAL (CENTER DISCHARGE UNITS)	1
32496499	TANK, AIR RECEIVER - 80 GALLON VERTICAL (FULLY PACKAGED UNITS)	1
32498768	TANK, AIR RECEIVER - 80 GALLON HORIZONTAL (175 PSIG UNITS)	1
32251837	TANK, AIR RECEIVER - 80 GALLON HORIZONTAL (250 PSIG UNITS)	1
32223596	VALVE, BALL - 3/4 (CENTER DISCHARGE UNITS)	1
32106569	VALVE, BALL - 3/4 (FULLY PACKAGED UNITS)	1
32027120	VALVE, MANUAL DRAIN (CENTER DISCHARGE UNITS)	1

BASEPLATE

CCN	DESCRIPTION	QTY
	BASEPLATE PACKAGE GROUP	1
32195224	ASSEMBLY, SUBBASE	1
32333445	ASSEMBLY, PRESSURE SWITCH TUBE	2
32048993	CLAMP	2

STARTERS

CCN	DESCRIPTION	QTY
	CENTER DISCHARGE UNITS	
56272305	STARTER, 5HP - 200-1-60	1
56272040	STARTER, 5HP - 230-1-60	1
56272057	STARTER, 5HP - 200-3-60	1
56272222	STARTER, 5HP - 230-3-60	1
56272230	STARTER, 5HP - 460-3-60	1
56272164	STARTER, 5HP - 575-3-60	1
56272297	STARTER, 7.5HP - 230-1-60	1
56272198	STARTER, 7.5HP - 200-3-60	1
56272131	STARTER, 7.5HP - 230-3-60	1
56272149	STARTER, 7.5HP - 460-3-60	1
56272214	STARTER, 7.5HP - 575-3-60	1
97330229	PLATE, STARTER MOUNT	1
	FULLY PACKAGED UNITS	
56272305	STARTER, 5HP - 200-1-60	1
56272040	STARTER, 5HP - 230-1-60	1
56272057	STARTER, 5HP - 200-3-60	1
81292468	STARTER, 5HP - 230/460-3-60	1
56272222	STARTER, 5HP - 230-3-60	1
56272164	STARTER, 5HP - 575-3-60	1
81292450	STARTER, 7.5HP - 230/460-3-60	1
56272297	STARTER, 7.5HP - 230-1-60	1
56272198	STARTER, 7.5HP - 200-3-60	1
56277214	STARTER, 7.5HP - 575-3-60	1

ELECTRIC DRAIN

CCN	DESCRIPTION	QTY
	COMMON	
54393335	ELBOW, STREET - 1/2	1
54579248	DRAIN, EDV ELECTRIC	1
95989638	CONNECTOR, SWIVEL - FEMALE	1
	VERTICAL TANK UNITS	
32237851	NIPPLE, LONG - 1/2 X 4-1/2	1
54386974	COUPLING, BRASS - 1/2	1
95242517	NIPPLE, LONG - 1/2 X 6	1

DRIVE

CCN	DESCRIPTION	QTY
	MOTORS - CENTER DISCHARGE UNITS	
32288631	MOTOR, 5HP - 230-1-60	1
97331656	MOTOR, 5HP - 230/460-3-60	1
97331649	MOTOR, 5HP - 200-3-60	1
97331664	MOTOR, 5HP - 575-3-60	1
32065526	MOTOR, 5HP - 200-1-60	1
97331656	MOTOR, 5HP - 230-3-60	1
32309437	MOTOR, 7.5HP - 230-1-60	1
97331680	MOTOR, 7.5HP - 230/460-3-60	1
97331672	MOTOR, 7.5HP - 200-3-60	1
	BELTS	
95099479	BELT, V - A62 (5HP CENTER DISCHARGE UNITS)	1
95099511	BELT, V - A70 (5HP FULLY PACKAGED UNITS)	1
95099461	BELT, V - A60 (7.5HP CENTER DISCHARGE UNITS)	1
	MOTORS - FULLY PACKAGED UNITS	
32065526	MOTOR, 5HP - 200-1-60	1
32288631	MOTOR, 5HP - 230-1-60	1
32036790	MOTOR, 5HP - 200-3-60	1
32036857	MOTOR, 5HP - 230/460-3-60	1
32036865	MOTOR, 5HP - 575-3-60	1
	SHEAVE SETS	
32281768	SET, SHEAVE (5HP)	1
54507975	SET, SHEAVE (7.5HP, 230-1-60)	1
54507967	SET, SHEAVE (7.5HP, ALL EXCEPT 230-1-60)	1
	COMMON	
32175556	CAPSCREW, SERRATED WASHER HEAD - 3/8-16 X 1 (MOTOR MOUNTING)	4
54370523	NUT, CONICAL KEPS - 3/8 (MOTOR MOUNTING)	VAR

240/120 1P

5HP
60 Amps
2 POLES

AIR COOLED AFTERCOOLER (ACAC)

CCN	DESCRIPTION	QTY
32174286	VALVE,SAFETY(DISCH)325PS SA25-0A325	1
32188450	TUBE ASSY,COMPR/ACAC 242 2420/2475	1
32322265	TUBE ASSY, ACAC/RECVR 2475N IFCV	1
32322273	TUBE ASSY, ACAC/RECVR 2475D IFCV	1
95031795	TUBE ELBOW 5/8X1/2 75A10B20 249IFHD10-8	1
32498149	COIL, AFTERCOOLER MODINE 2475 5HP	1
85582229	VALVE, CHECK 3/4" X 5/8T W/ 1/4" & 1/4T PORTS	1

BELTGUARD

CCN	DESCRIPTION	QTY
	WIRE STYLE (CENTER DISCHARGE UNITS)	
32499162	BACK, BELTGUARD - WIRE	1
32499170	FRONT, BELTGUARD - WIRE	1
32496093	CLIP, PVC COATED	4
95916078	WASHER, FLAT - 1/4 ZINC	3
97173595	CAPSCREW, SELF-TAP - 1/4-20 X 1/2	3
97330013	BRACE, WIRE BELTGUARD	1
	SHEET METAL STYLE (FULLY PACKAGED UNITS)	
32281040	BACK, BELTGUARD - SHEET METAL	1
32281057	BRACE, SHEET METAL BELTGUARD (ATTACH TO LOW PRESSURE HEAD)	1
32281065	BRACE, SHEET METAL BELTGUARD (ATTACH TO HIGH PRESSURE HEAD)	1
32281073	COVER, AIR COOLED AFTERCOOLER	1
32000705	SCREW, SELF-TAPPING - 3/8-16 X 3/4	4
32187056	SCREW, SELF-DRILL - 1/4-14	14

DUPLEX ELECTRIC MOTOR MODELS

AIR COMPRESSOR PUMP

CCN	DESCRIPTION	QTY
32304370	PUMP, BARE COMPRESSOR	2
95114476	CAPSCREW, HEX - 1/2-13 X 1-1/2 (TO MOUNT PUMP TO BASE)	8
95716890	LOCKWASHER, SPRING - 1/2 (FOR PUMP MOUNTING CAPSCREWS)	8

CONTROLS

CCN	DESCRIPTION	QTY
56288764	SWITCH, PRESSURE - WITH UNLOADER VALVE	1
56288798	SWITCH, PRESSURE	1
95426714	NIPPLE, CLOSE	1
32013872	GAUGE, PRESSURE	1
32179038	PLUG, PIPE	4
32301483	ASSEMBLY, SHUTTLE VALVE	1
32333528	ASSEMBLY, TUBE - IC/IC 2-2475D TANK (LEAD/LAG)	1
32333015	ASSEMBLY, TUBE - PL.UNL SH VLV/DUP SIEMENS 2-2475D	1

BASE PACKAGE

CCN	DESCRIPTION	QTY
32251894	TANK, AIR RECEIVER - 2-2475D	1
32251902	TANK, AIR RECEIVER - 2-2475E	1
32223596	ASSEMBLY, BALL VALVE - 3/4" (2-2475D)	1
32223604	ASSEMBLY, BALL VALVE - 1" (2-2475E)	1
32116295	ASSEMBLY, TUBE - REC / MTD BLOCK RIGHT HAND (2-2475E7.5)	1
32116303	ASSEMBLY, TUBE - REC / MTD BLOCK LEFT HAND (2-2475E7.5)	1
32116382	ASSEMBLY, TUBE - REC / MTD BLOCK RIGHT HAND (2-2475D5)	1
32116390	ASSEMBLY, TUBE - REC / MTD BLOCK LEFT HAND (2-2475D5)	1
32333551	ASSEMBLY, TUBE - REC / MTD BLOCK RIGHT HAND (2-2475E5)	1
32333544	ASSEMBLY, TUBE - REC / MTD BLOCK LEFT HAND (2-2475E5)	1
31385693	VALVE, SAFETY/ RELIEF - 200 PSIG	1
32157554	CONNECTOR, MALE - 5/16 X 1/4	2
32179038	PLUG, PIPE - 1/4 (2-2475E)	1
32236333	ASSEMBLY, TUBE - SHUTTLE VALVE / I/C TEE (2-2475E)	1
95007522	TEE, MALE TUBE - 5/16 X 1/8	1
95037453	BUSHING, REDUCER - 3/4 X 1/4	1
95037826	BUSHING, REDUCING - 1-1/2 X 1	1

MOTORS

CCN	DESCRIPTION	QTY
32036931	MOTOR, 7.5 HP - 200-3-60	2
32036972	MOTOR, 7.5 HP - 230/460-3-60	2
32036980	MOTOR, 7.5 HP - 575-3-60	2
32175556	CAPSCREW, 3/8-16 X 1	8
37177052	CLAMP, MOTOR	2
37177656	BOLT, BELT TIGHTENER	2
37179207	CLIP, BELT TIGHTENER	2
54370523	NUT, CONICAL KEPS - 3/8	4
56271406	SET, SHEAVE	2
95677324	BELT, V - A74	2

ALTERNATORS

CCN	DESCRIPTION	QTY
56272917	ALTERNATOR, 7.5 HP - 200-3-60	1
56272966	ALTERNATOR, 7.5 HP - 230-3-60	1
56273030	ALTERNATOR, 7.5 HP - 460-3-60	1
56273063	ALTERNATOR, 7.5 HP - 575-3-60	1
95074266	SCREW, TAPPING - 1/4-20 X 1/2	3
32298705	BRACKET, ALTERNATOR	1
32000705	SCREW, SELF-TAPPING - 3/8-16 X 3/4	4
VAR.	HEATER	6

AIR COOLED AFTERCOOLER

CCN	DESCRIPTION	QTY
95037826	BUSHING, REDUCING - 1-1/2 X 1	1
95006565	TEE, PIPE - 1"	1
95640074	NIPPLE, CLOSE 1 X 1-1/2	1
32186421	BUSHING, REDUCING - 1 X 3/4	2
85582112	VALVE, CHECK - 3/4 X 3/4	2
32174286	VALVE, SAFETY / RELIEF - DISCHARGE (325 PSIG)	2
32324295	ASSEMBLY, TUBE - ACAC / TANK	2
32324287	ASSEMBLY, TUBE - PUMP / ACAC	2
32498065	COIL, AFTERCOOLER - 7.5HP	2

BELTGUARD

CCN	DESCRIPTION	QTY
32281040	BACK, BELTGUARD - SHEET METAL	2
32281057	BRACE, SHEET METAL BELTGUARD (ATTACH TO LOW PRESSURE HEAD)	2
32281065	BRACE, SHEET METAL BELTGUARD (ATTACH TO HIGH PRESSURE HEAD)	2
32281073	COVER, AIR COOLED AFTERCOOLER	2
32000705	SCREW, SELF-TAPPING - 3/8-16 X 3/4	8
32187056	SCREW, SELF-DRILL - 1/4-14	28

PNEUMATIC DRAIN VALVE

CCN	DESCRIPTION	QTY
32311102	ASSEMBLY, PNEUMATIC DRAIN VALVE	1
32496325	TEE, MALE RUN	1
32335457	ASSEMBLY, TUBE - DRAIN VALVE TO COMPRESSOR	1
32311128	ASSEMBLY, TUBE - CONDENSATE	1
95110441	ELBOW, TUBE - 5/16 X 1/4	1

GASOLINE ENGINE MODELS

CCN	DESCRIPTION	QTY
	TUBING GROUP	
32343733	ASSEMBLY, DISCHARGE TUBE - KOHLER BASEPLATE MOUNTED UNITS	1
32343709	ASSEMBLY, DISCHARGE TUBE - KOHLER TANK MOUNTED UNITS	1
32343741	ASSEMBLY, DISCHARGE TUBE - KAWASAKI BASEPLATE MOUNTED UNITS	1
32343717	ASSEMBLY, DISCHARGE TUBE - KAWASAKI TANK MOUNTED UNITS	1
32343758	ASSEMBLY, DISCHARGE TUBE - HONDA BASEPLATE MOUNTED UNITS	1
32343725	ASSEMBLY, DISCHARGE TUBE - HONDA TANK MOUNTED UNITS	1
	CONTROLS GROUP	
54398508	CONTROL, THROTTLE SLOWDOWN - KOHLER BASEPLATE MOUNTED UNITS	1
54398144	CONTROL, THROTTLE SLOWDOWN - KOHLER TANK MOUNTED UNITS	1
54398169	CONTROL, THROTTLE SLOWDOWN - KAWASAKI UNITS	1
54398151	CONTROL, THROTTLE SLOWDOWN - HONDA UNITS	1
49816283	VALVE, AUXILIARY	1
32174286	* VALVE, SAFETY / RELIEF - 325 PSIG DISCHARGE	1
31385693	* VALVE, SAFETY / RELIEF - 200 PSIG RECEIVER	1
37155751	* MUFFLER, DISCHARGE UNLOADER	1
32013898	GAUGE, PRESSURE - BASEPLATE MOUNTED UNITS	1
81296253	GAUGE, PRESSURE - TANK MOUNTED UNITS	1
95031795	TUBE ELBOW 5/8X1/2 (ALL)	1
95481982	NIPPLE, PIPE - 1/2" X 3" (KAWASAKI TANK MOUNTED)	1
32262545	NIPPLE, PIPE - 1/2" X 4" (KOHLER / HONDA TANK MOUNTED)	1
	AIR RECEIVER TANK GROUP	
32175507	TANK, AIR RECEIVER - BASEPLATE MOUNTED UNITS	1
32496697	TANK, AIR RECEIVER - KOHLER / HONDA TANK MOUNTED UNITS	1
32497372	TANK, AIR RECEIVER - KAWASAKI TANK MOUNTED UNITS	1
32223588	VALVE, SERVICE	1
32027120	VALVE, MANUAL DRAIN	1
32309346	KIT, VIBRATION MOUNT - HONDA TANK MOUNTED UNITS	1
32209165	BRACKET, TANK MOUNTING - BASEPLATE MOUNTED UNITS	2
32034134	BOLT, U - BASEPLATE MOUNTED UNITS	2
	BASEPLATE UNIT GROUP	
32140576	SUBBASE, KOHLER BASEPLATE MOUNTED UNITS	1
32309221	SUBBASE, HONDA BASEPLATE MOUNTED UNITS	1
32497356	SUBBASE, KAWASAKI BASEPLATE MOUNTED UNITS	1
95944633	BUSHING, 3/4 X 1/4 (BASEPLATE MOUNTED UNITS)	2
32178998	BUSHING, REDUCING - 3/4 X 1/2 (BASEPLATE MOUNTED UNITS)	1
95043766	CAPSCREW, HEX - 3/8-16 X 1-1/2 (BASEPLATE MOUNTED UNITS)	4
95675526	LOCKWASHER, 5/16 (BASEPLATE MOUNTED UNITS)	4
39128558	NUT, WHIZ-LOCK - 5/16-18 (BASEPLATE MOUNTED UNITS)	4
	BELTGUARD GROUP	
56278906	BACK, BELTGUARD - KOHLER UNITS	1
32497398	BACK, BELTGUARD - KAWASAKI UNITS	1
32308124	BACK, BELTGUARD - HONDA UNITS	1
56278922	FRONT, BELTGUARD - KOHLER UNITS	1
32497406	FRONT, BELTGUARD - KAWASAKI UNITS	1
32308116	FRONT, BELTGUARD - HONDA UNITS	1
32281057	BRACE, BELTGUARD - LP - KOHLER UNITS	1
32497919	BRACE, BELTGUARD - LP- KAWASAKI UNITS	1
32308686	BRACE, BELTGUARD - HONDA UNITS	1
32281065	BRACE, BELTGUARD - HP - KOHLER UNITS	1
32497414	BRACE, BELTGUARD - HP - KAWASAKI UNITS	1
32000705	SCREW, SELF-TAPPING - 3/8-16 X 3/4	VAR
32187056	SCREW, SELF-DRILLING - 1/4-14	VAR
95916094	WASHER, FLAT - 3/8 - KAWASAKI UNITS	2
	ENGINE & DRIVE GROUP	
97337901	ENGINE, KOHLER - NO ALTERNATOR	1
97337919	ENGINE, KOHLER - WITH ALTERNATOR	1
32497331	ENGINE, KAWASAKI - NO ALTERNATOR	1
32497349	ENGINE, KAWASAKI - WITH ALTERNATOR	1
81297467	ENGINE, HONDA	1
32295891	BELT, DRIVE - KOHLER UNITS	1
32497869	BELT, DRIVE - KAWASAKI UNITS	1
32310153	BELT, DRIVE - HONDA UNITS	1
56276207	SHEAVE, KOHLER ENGINE	1
32497554	SHEAVE, KAWASAKI ENGINE	1
81297475	SHEAVE, HONDA ENGINE	1
32497935	CLAMP, ENGINE - KAWASAKI UNITS	1
32497877	TENSIONER, BELT - KAWASAKI UNITS (INCL CLAMP, MOUNTING CAPSCREWS, TENSIONING BOLT & CLIP)	1
32145898	TENSIONER, BELT - KOHLER & HONDA UNITS	1
30219802	CLIP, BELT TIGHTENER - KOHLER & HONDA UNITS	1
32308140	BRACE, ENGINE / COMPRESSOR - HONDA UNITS	1
32246621	BRACE, ENGINE / COMPRESSOR - KOHLER UNITS	1
95203444	KEY, KOHLER & HONDA UNITS	1
	MISCELLANEOUS HARDWARE & FITTINGS	
95417507	NIPPLE, CLOSE - 1/2 X 1-1/8 - KAWASAKI BASEPLATE MOUNTED UNITS	1
32224909	ELBOW, STREET - 1/8 X 1/8 - KAWASAKI BASEPLATE MOUNTED UNITS	1
32499139	CAPSCREW, 5/16-18 X 1-3/4 - KAWASAKI UNITS	2
39128558	NUT, WHIZ-LOCK - 5/16-18 - KAWASAKI UNITS	4
32175556	CAPSCREW, 3/8-16 X 1 - HONDA UNITS	1
95077053	CAPSCREW, 3/8-16 X 1-1/2 - KOHLER & HONDA UNITS	3
95104014	CAPSCREW, 7/16-14X1-1/4 - KOHLER BASEPLATE MOUNTED UNITS	1
95916854	CAPSCREW, HEX - 7/16 X 1-1/4 - KOHLER TANK MOUNTED UNITS	1
39128566	NUT, WHIZ-LOCK - 3/8-16 (KOHLER / HONDA)	4
95423695	NUT, HEX - 1/2 - KOHLER & HONDA UNITS	1
95916094	WASHER, FLAT - 3/8 - KAWASAKI UNITS	1
32130387	WASHER, FLAT - 7/16 (2475X12.5G)	VAR
95751582	LOCKWASHER, 7/16 - KOHLER UNITS	1
	COMPRESSOR PUMP GROUP	
32313322	PUMP, BARE COMPRESSOR (INCL STD FILTER & INTERCOOLER SAFETY / RELIEF VALVE)	1
95114476	CAPSCREW, HEX - 1/2-13 X 1-1/2	4
95716890	LOCKWASHER, SPRING - 1/2	4

SERVICE AND ACCESSORY PARTS AND KITS

SERVICE

START-UP KITS

Each Start-Up Kit contains the necessary quantities of All-Season Select Lubricant and standard air filter element(s) to start-up and maintain your compressor for the first year. Start-Up Kits for engine driven models include a replacement engine air filter, engine oil filter and engine oil. See the engine manufacturer's instructions for more detailed engine care information.

CCN	DESCRIPTION	MODELS
32305880	KIT, START-UP	ELECTRIC MOTOR MODELS
32312936	KIT, START-UP	HONDA ENGINE MODELS
32305872	KIT, START-UP	KOHLER ENGINE MODELS
32498511	KIT, START-UP	KAWASAKI ENGINE MODELS

MAINTENANCE PAKS

Maintenance paks contain all the parts necessary for one complete routine maintenance of your compressor. All-Season Select Lubricant, air filter elements and gaskets are included.

CCN	DESCRIPTION
38485330	PAK, MAINTENANCE

STEP SAVER KITS

Step Saver Kits provide all the parts required to perform common repair or scheduled maintenance tasks, such as piston ring replacement or valve replacement.

CCN	DESCRIPTION
32301426	KIT, VALVE
32301517	KIT, RING
32301509	KIT, BEARING & ROD*
32301434	KIT, GASKET

* To repair grooved crankshaft journals, order Shaft Repair Kit 32499949 along with the Bearing & Rod Kit.

OVERHAUL KITS

CCN	DESCRIPTION
32319469	KIT, OVERHAUL

RECOMMENDED SPARES

ITEM	CCN	DESCRIPTION	QTY
1-15	32247884	GASKET, FRAME END COVER	1
1-20	32247850	O-RING, OIL FILLER PLUG	1
1-23	32499923	L SEAL	1
1-24	32247876	GASKET, SHAFT END COVER	1
REF.	32310799	ASSEMBLY, VALVE PLATE - HIGH PRESSURE	1
REF.	32248205	ASSEMBLY, VALVE PLATE	1
4-1	32496598	PISTON, AIR - COMPLETE - 2.5" HIGH PRESSURE	1
4-5	32307910	SET, PISTON RING - 2.5"	1
4-6	32247868	GASKET, CYLINDER/FLANGE	2
4-10	32246878	O-RING, VALVE PLATE - HIGH PRESSURE	1
4-12	32247926	GASKET, AIRHEAD - HIGH PRESSURE	1
4-14	32496564	PISTON, AIR - COMPLETE - 4" - LOW PRESSURE	1
4-18	32307928	SET, PISTON RING - 4"	1
4-20	32248197	GASKET, VALVE PLATE - LOW PRESSURE	1
4-22	32248189	GASKET, AIRHEAD - LOW PRESSURE	1

GASOLINE ENGINE PARTS

CCN	DESCRIPTION	MODELS
32305674	FILTER, OIL	KOHLER ENGINE MODELS
32305682	FILTER, AIR	KOHLER ENGINE MODELS
32305690	PRE FILTER	KOHLER ENGINE MODELS
38487039	KIT, MUFFLER	KOHLER ENGINE MODELS
32498545	FILTER, OIL	KAWASAKI
32498537	FILTER, AIR	KAWASAKI
32498529	PRE FILTER	KAWASAKI

COMPRESSOR LUBRICANT

All Season T30 Select is a synthetic fluid specifically formulated to protect and preserve your Ingersoll-Rand small reciprocating air compressor through a broad range of temperature as well as better start-up in colder climate conditions. With its outstanding formulation, All Season T30 Select enables you to run 2000 hours of service between changeouts under normal operating conditions.

PART NO.	DESCRIPTION
32318875	LUBRICANT, ALL SEASON SELECT - QUART
32318883	LUBRICANT, ALL SEASON SELECT - CASE OF 12 QUARTS

ACCESSORIES

INSTALLATION KITS

Each Installation Kit combines vibration pads and flexible hose into one kit. The kit consists of (4) 5 X 5 vibration pads and (1) ¾ X 13 flexible hose.

CCN	DESCRIPTION
38002242	KIT, INSTALLATION

SILENCERS

Silencers provide excellent noise reduction (2 DBA or 35% reduction in operating noise level) with no pressure drop.

CCN	DESCRIPTION
32323552	SILENCER

VIBRATION PADS

Vibration pads are designed to absorb 40-60% of the sound and vibration of your compressor.

CCN	DESCRIPTION
32320681	PAD, VIBRATION — 4 X 4 STEEL PLATE
32320699	PAD, VIBRATION — 5 X 5 STEEL PLATE
32321002	PAD, VIBRATION — 4 X 4 CORK
32321028	PAD, VIBRATION — 5 X 5 CORK
32321010	PAD, VIBRATION — 6 X 6 CORK

FLEX HOSES

Flex Hoses give flexibility to compressed air piping systems. They provide thermal growth absorption, misalignment compensation, vibration isolation, reduced stress forces on compressor housings and noise reduction.

CCN	DESCRIPTION
32323586	HOSE, FLEX — ½ X 11
38335295	HOSE, FLEX — ½ X 36
38338778	HOSE, FLEX — ½ X 72
32323594	HOSE, FLEX — ¾ X 13
38323309	HOSE, FLEX — ¾ X 24
38335303	HOSE, FLEX — ¾ X 36
38338638	HOSE, FLEX — ¾ X 72
32323602	HOSE, FLEX — 1 X 14
38334033	HOSE, FLEX — 1 X 24
38335311	HOSE, FLEX — 1 X 36
38338646	HOSE, FLEX — 1 X 72
32323610	HOSE, FLEX — 1-½ X 18
38323317	HOSE, FLEX — 1-½ X 20-½
38323325	HOSE, FLEX — 1-½ X 24

Y-STRAINERS

Y-Strainers are designed to prevent foreign particles and sludge from moving downstream.

CCN	DESCRIPTION
32323628	Y-STRAINER, 1/4
32323636	Y-STRAINER, 1/2

INTERCOOLER SEPARATOR KITS

Intercooler Separator Kits remove condensate between the first and second stages.

CCN	DESCRIPTION
32337826	KIT, INTERCOOLER SEPARATOR

EXTERNAL CRANKCASE HEATER KITS

External crankcase heaters are recommended when ambient temperatures are consitently below 32°F (0°C). An easy-to-install external creankcase heater kit is intended for aftermarket use. Two kits may be required for some applications.

CCN	DESCRIPTION
97330385	KIT, EXTERNAL CRANKCASE HEATER

CONSTANT SPEED CONVERSION KITS

Extend the life of your compressor in hot and humid operating conditions by installing Constant Speed Control.

CCN	DESCRIPTION	MODELS
81294621	KIT, CONSTANT SPEED CONVERSION	2475N5/7.5 W/4-FOOT RECEIVER
81294639	KIT, CONSTANT SPEED CONVERSION	2475N7.5 W/3-FOOT RECEIVER
81294688	KIT, CONSTANT SPEED CONVERSION	2475D5
81295867	KIT, CONSTANT SPEED CONVERSION	2475N5 W/3-FOOT RECEIVER

BATTERY SUPPORT KITS

The Battery Support Kit will allow a battery to be conveniently mounted on the Kohler, Honda and kawasaki engine driven compressors. The kit contains the battery support, battery hold-down frame and attachment hardware.

CCN	DESCRIPTION	MODELS
32095663	KIT, BATTERY SUPPORT	KOHLER, HONDA, KAWASAKI ENGINE MODELS

VINYL COVERS

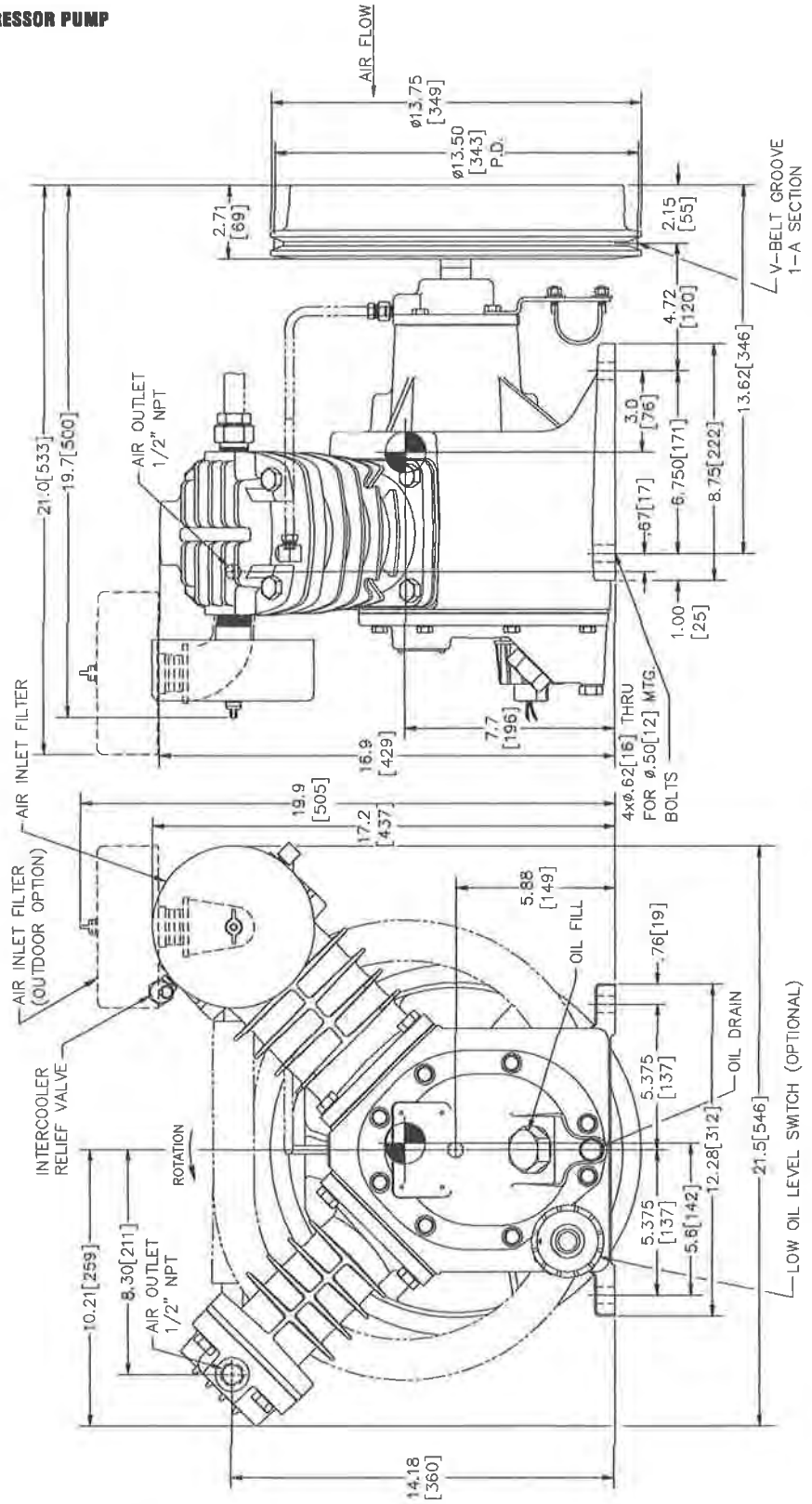
Flame retardant vinyl covers are designed to protect gasoline engine compressors from the elements.

CCN	DESCRIPTION	MODELS
97339337	COVER, VINYL	KOHLER, HONDA, KAWASAKI ENGINE MODELS

GENERAL ARRANGEMENT DRAWINGS

BARE COMPRESSOR PUMP

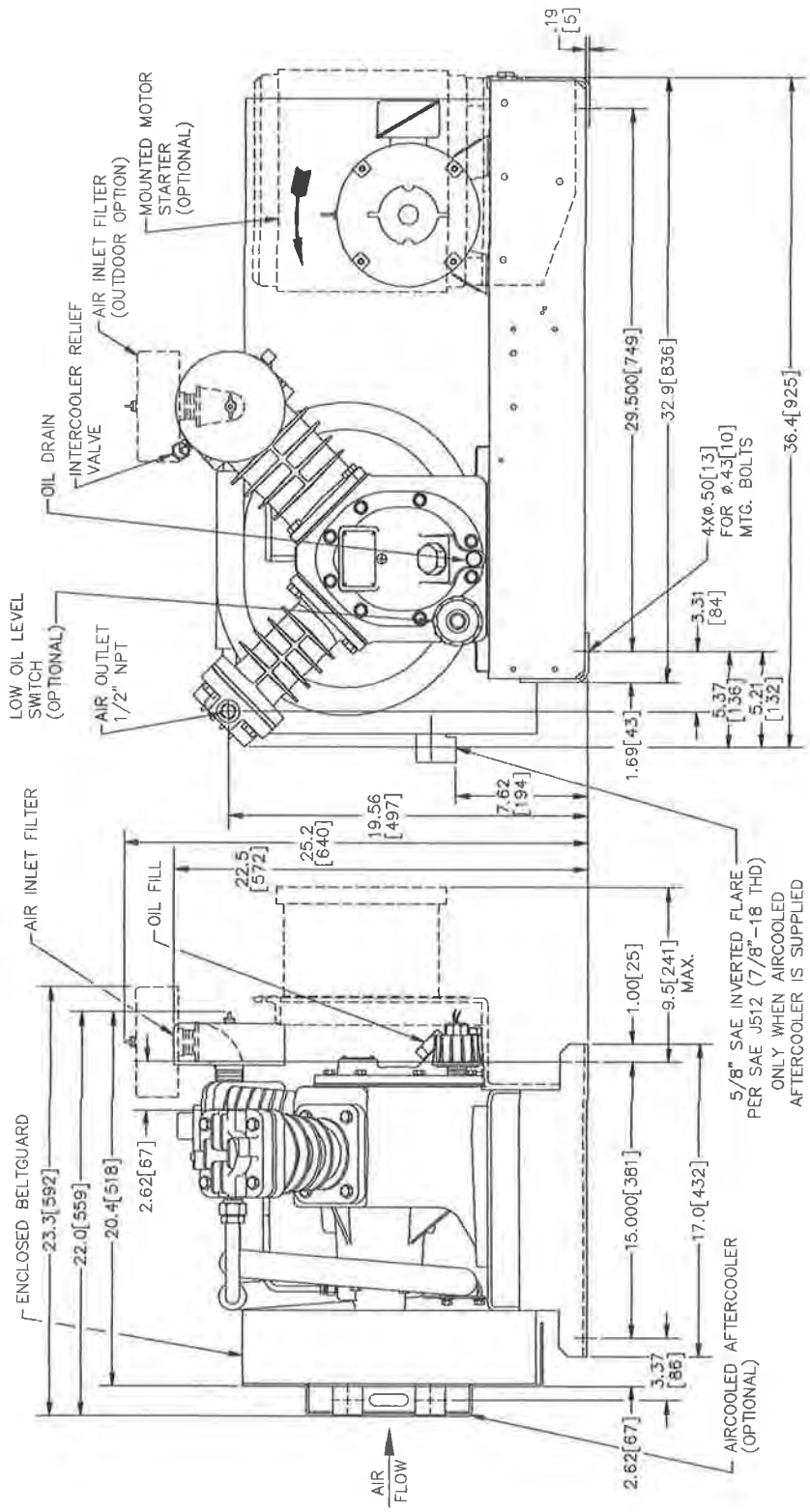
G2111000-04



NOTES:
1. CUSTOMER MUST SUPPLY MTG. ARRANGEMENT WITH AT LEAST 2.00[51] MIN. BELT TAKE-UP.
2. ALL DIMENSIONS GIVEN IN INCHES.
3. LEAVE AT LEAST 12.00[305] MIN. CLEARANCE ON ALL SIDES FOR PROPER AIR CIRCULATION.
4. WEIGHT: 147 LBS.[67kg] DRY (NO LUBRICATION)
5. ALL UNSPECIFIED TOLERANCES:
   XXX = ±.03[1]
   XX = ±.12[3]
   X = ±.25[6]
6. DIMENSIONS IN [ ] ARE MILLIMETER DIMENSIONS UNLESS OTHERWISE SPECIFIED.

BASEPLATE MOUNTED UNIT WITH ELECTRIC MOTOR

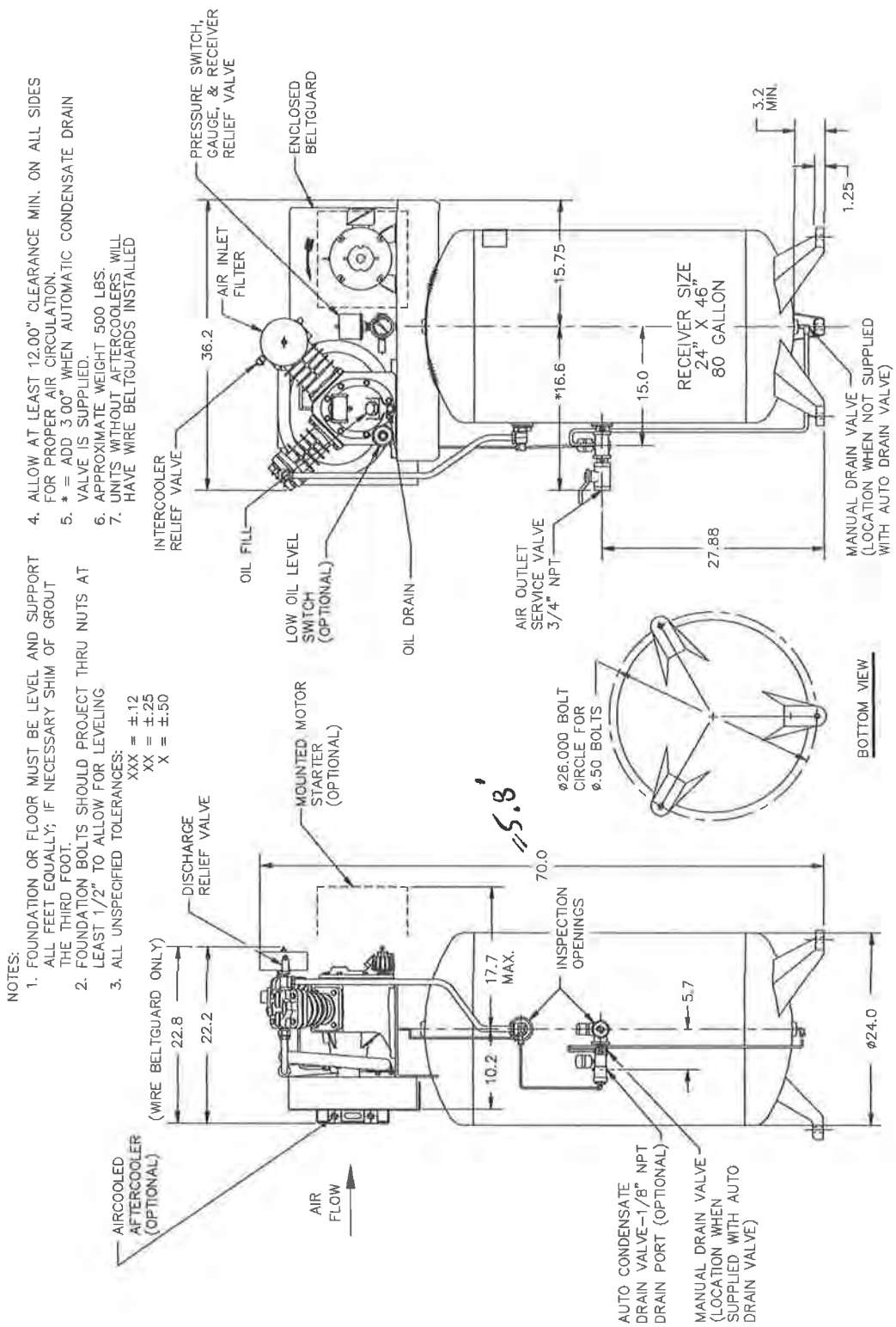
G2211000-05



NOTES:
1. FOUNDATION OR FLOOR MUST BE LEVEL AND SUPPORT ALL FEET EQUALLY; IF NECESSARY SHIM OR GROUT THE FOURTH FOOT.
2. FOUNDATION BOLTS SHOULD PROJECT THRU NUTS AT LEAST 1/2" [13] TO ALLOW FOR LEVELING.
3. ALLOW AT LEAST 12.00"[305] CLEARANCE MINIMUM ON ALL SIDES FOR PROPER AIR CIRCULATION.
4. APPROXIMATE NET WEIGHT: 350 LBS.[159kg].
5. ALL UNSPECIFIED DIMENSIONS: XXX = .125[3]
   XX = .25[6]
   X = .50[13]
6. DIMENSIONS IN [ ] ARE MILLIMETER DIMENSIONS UNLESS OTHERWISE SPECIFIED.

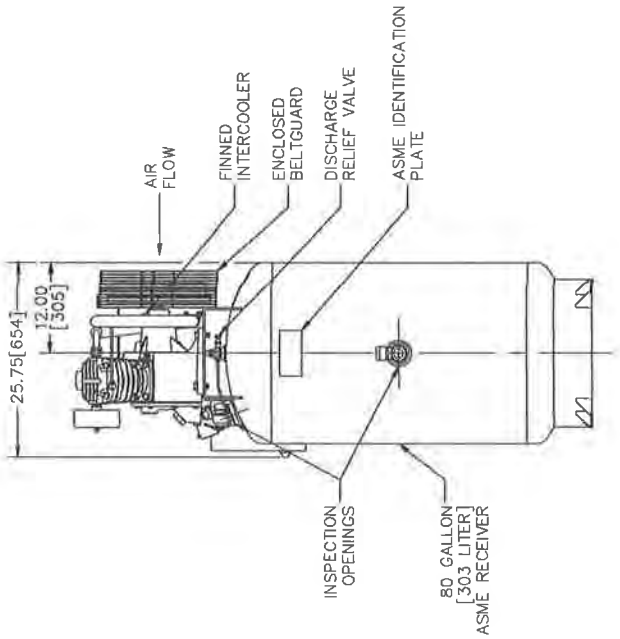
80-GALLON VERTICAL TANK MOUNTED UNIT — FULLY PACKAGED

G2811300-01

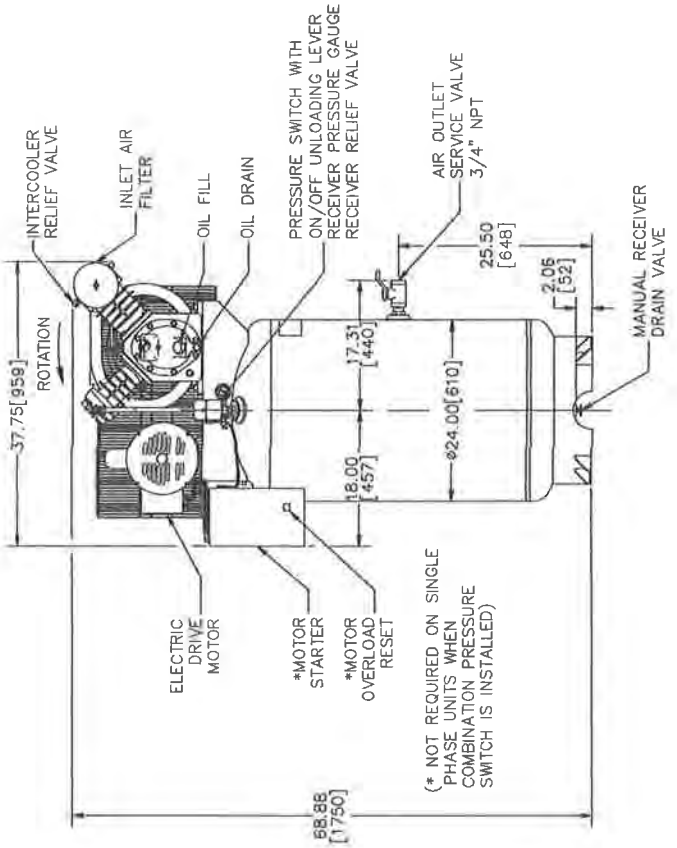


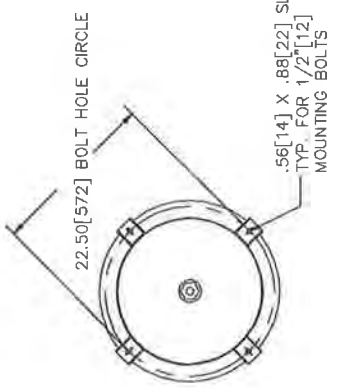
80-GALLON VERTICAL TANK MOUNTED UNIT

G2811302-02



NOTES:
1 FOUNDATION OR FLOOR MUST BE STRUCTURALLY SOUND, SUPPORT ALL FEET EQUALLY. IF NECESSARY SHIM OR GROUT THE FEET TO LEVEL.
2. FOUNDATION BOLTS MUST PROJECT THROUGH THE FEET AT LEAST 1/2"[13] TO ALLOW FOR LEVELING
3. ALL UNSPECIFIED TOLERANCES:
   .XXX = ±.12[3]
   .XX = ±.25[6]
   .X = ±.5[13]
4. ALLOW AT LEAST 12"[305] ON ALL SIDE OF THE MACHINE TO ALLOW PROPER AIR CIRCULATION AND MAINTENANCE
5. APPROXIMATE WEIGHT 500 LBS.[227]
6. DIMENSIONS IN [ ] ARE MILLIMETER DIMENSIONS UNLESS OTHERWISE SPECIFIED





LOOK WHAT INGERSOLL-RAND CAN DO FOR YOU!

Efficient Field Service

We maintain a highly trained staff of technicians to service your equipment for preventive maintenance, or to assist you should emergencies ever occur.

Complete Repair Service

Our trained technicians will repair or overhaul your equipment to factory specifications, using only genuine I-R parts.

Special Engineering Service

We can help you identify and solve your problems by evaluating your needs and recommending the proper equipment to give you maximum efficiency.

Spare Parts

By stocking genuine I-R spare parts, we can help you avoid costly delays or substituting inferior parts. Using genuine I-R parts on you I-R equipment will help to keep even older equipment running in good-as-new condition.

Complete Stock of Equipment

We carry a complete line of I-R equipment and accessories designed to meet any compressed air application. We are backed by I-R's prompt factory shipment to ensure you on-time delivery.

A SUBSTITUTE IS NOT A REPLACEMENT!

Ensure you get peak performance and longevity out of your Ingersoll-Rand product by insisting on genuine Ingersoll-Rand replacement parts and maintenance kits. Not only are the replacement parts made to precise dimensions and OEM-specified metallurgy, but each part is backed by the Ingersoll-Rand warranty. Your local Air Center, Distributor, or direct Ingersoll-Rand salesperson will work with you to ensure you get the parts you need to do the job right. Equip your machines with only the best — Ingersoll-Rand genuine parts.

NOTE: THE USE OF REPAIR PARTS OTHER THAN THOSE INCLUDED WITHIN THE INGERSOLL-RAND COMPANY APPROVED PARTS LIST MAY CREATE UNSAFE CONDITIONS OR MECHANICAL FAILURES OVER WHICH INGERSOLL-RAND COMPANY HAS NO CONTROL. INGERSOLL-RAND COMPANY SHALL BEAR NO RESPONSIBILITY FOR EQUIPMENT ON WHICH NON-APPROVED REPAIR PARTS ARE INSTALLED.

80445703
Rev. A
September 2009

Save These Instructions

Quick Start Manual
For Permanently Installed Stationary Reciprocating Air Compressors

EN Quick Start Manual (P. EN-1)
ES Manual inicio rápido (P. ES-1)
FR Guide de démarrage rapide (P. FR-1)

CONTENTS

WARRANTY & PRODUCT REGISTRATION

Ingersoll Rand warrants the equipment for a period of twelve (12) months from the date of placing the equipment in operation or eighteen (18) months from the date of shipment, whichever occurs first.

Compressors operated solely on All Season Select synthetic compressor lubricant will have their bare compressor pump (ONLY THE PUMP) warranted for the earlier of twenty-four (24) months from the date of initial operation or thirty (30) months from date of shipment.

To register your product, you must contact your local full service air solutions provider. To locate your nearest provider:

1. Go to http://www.ingersollrandproducts.com in your Web browser.
2. Select Americas Region from main page.
3. Click "Customer Service".
4. Click "Contact Us".
5. Click "Compressed Air Solutions".
6. If you are located in the United States, enter your 5-digit zip code in the field to find your local full service air solutions provider and then press "Search on Zip Code". If you are located outside of the United States, select your country from the "International Locations" list and then press "Submit".

EXPLANATION OF SAFETY SIGNAL WORDS

⚠ DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or property damage.
NOTICE	Indicates information or a company policy that relates directly or indirectly to the safety of personnel or protection of property.

RECEIPT & INSPECTION

Ensure adequate lifting equipment is available for unloading and *moving the compressor to the installation site.*

⚠ WARNING

- Lifting equipment must be properly rated for the weight of the compressor. Weight information is printed on a label attached to the shipping container.
- Lift the compressor by the shipping skid only.
- Do not use the motor lifting eye to lift the entire compressor. The motor lifting eye is for removing the motor from the compressor only.
- Do not work on or walk under the compressor while it is suspended.

Use suitable lifting equipment (i.e. forklift) to lift and transport the compressor to the installation site. Ensure the lifting equipment, straps, etc. are capable of supporting the weight of the compressor.

Lifting Equipment and Straps

Before signing the delivery receipt, inspect for damage and missing parts. If damage or missing parts are apparent, make the appropriate notation on the delivery receipt, then sign the receipt. Immediately contact the carrier for an inspection.

All material must be held in the receiving location for the carrier's inspection.

Delivery receipts that have been signed without a notation of damage or missing parts are considered to be delivered "clear." Subsequent claims are then considered to be concealed damage claims. Settle damage claims directly with the transportation company.

If you discover damage after receiving the compressor (concealed damage), the carrier must be notified within 15 days of receipt and an inspection must be requested by telephone with confirmation in writing. On concealed damage claims, the burden of establishing that the compressor was damaged in transit reverts back to the claimant.

Read the compressor nameplate to verify it is the model ordered, and read the motor nameplate to verify it is compatible with your electrical conditions.

Make sure electrical enclosures and components are appropriate for the installation environment.

Do not use a triple voltage three-phase motor for 200-208 voltage three phase application. Use a 200 volt motor only.

GENERAL SAFETY RULES

DANGER

INHALATION HAZARD. Will cause serious injury or death.

- **Can contain carbon monoxide or other contaminants. Ingersoll Rand air compressors are not designed, intended, or approved for breathing air applications. Ingersoll Rand *does not approve specialized equipment for breathing air* application and assumes no responsibility or liability for compressors used for breathing air services.**
- **Do not directly inhale compressed air.**
- **Follow precautions on container labels before spraying materials such as paint, insecticide and weed killer.**
- **Wear a respirator when spraying.**

WARNING

FLAMMABLE VAPORS. Can cause a fire or explosion and result in serious injury or death.

- **Do not operate electric motor driven compressors where flammable or explosive liquids or vapors such as gasoline, natural gas and solvents are present.**
- **Do not operate gasoline engine driven compressors near an *open flame.***

HAZARDOUS VOLTAGE. Can cause serious injury or death.

- **Disconnect power and relieve pressure from tank before servicing.**
- **Compressor must be connected to properly grounded circuit by a qualified electrician following applicable electrical codes. Refer to the ELECTRICAL CONNECTIONS section of this manual.**
- **Do not operate compressor in wet conditions. Store indoors.**

MOVING PARTS. Can cause serious injury.

- **Do not operate with guards or shields removed, damaged or broken.**
- **Machine may start automatically. Disconnect power before servicing.**

HOT SURFACES. Can cause serious injury. Burns may occur.

- **Do not touch the compressor pump, motor or discharge tubing during or shortly after operation. These parts become hot. Allow to cool before touching.**

HIGH PRESSURE AIR. Can cause serious injury.

- **Do not remove, adjust, bypass, change, modify or make substitutions for safety/relief valves or other pressure control related devices.**
- **Rusted tanks can cause explosion and severe injury or death.**
- **Drain tank daily or after each use. Drain valve located at bottom of tank.**
- **Do not over-pressurize the receiver tank or similar vessels beyond design limits. Refer to compressor nameplate for this information.**
- **Do not use a receiver tank or similar vessels that fail to meet the design requirements of the compressor. Contact your distributor for assistance.**
- **Do not drill into, weld or otherwise alter the receiver tank or similar vessels.**
- **Do not use air tools or attachments without first determining the maximum pressure recommended for that equipment.**
- **Do not point air nozzles or sprayers toward anyone.**

RISK OF BURSTING. Can cause serious injury.

- **Use only suitable air handling parts acceptable for pressure of not less than the maximum allowable working pressure of the machine. Refer to compressor nameplate for this information.**

FLYING DEBRIS. Can cause serious injury to eyes.

- **Wear eye protection at all times.**

NOISE HAZARD. Can cause serious injury to ears.

- **Wear ear protection at all times.**

NOTICE

Do not remove, paint over or deface decals. Replace any missing decals.

SELECTING A LOCATION

ELECTRIC MOTOR COMPRESSORS

For most electric motor compressors, select a relatively clean and dry well lighted indoor area with plenty of space for proper ventilation, cooling air flow and accessibility. Provide 1,000 cubic feet of fresh air per minute per 5 horsepower. Ventilation by gravity or mechanical means is approved. Locate the compressor at least 12 inches (30 cm) from walls, and make sure the main power supply is clearly identified and accessible.

Unless the electrical components of the compressor are specially protected for outdoor use, do not install an electric motor compressor outdoors or in an area that will expose the electrical components to rain, snow or sources of appreciable moisture.

WARNING

FOR COMPRESSORS EQUIPPED WITH ELECTRIC DRAIN VALVES

The electric drain valve incorporates arcing or sparking parts, such as snap switches, receptacles and the like that tend to produce arcs or sparks and, therefore, when located in a garage, the compressor should be in a room or enclosure provided for the purpose, or the electric drain valve should be 18 inches (45 cm) or more above the floor. To relocate the valve, contact your local Ingersoll Rand dealer to obtain an electric drain valve *relocation kit.*

GASOLINE ENGINE COMPRESSORS

For gasoline engine compressors, keep the engine at least 3 feet (1 m) away from building walls and other equipment. Install the compressor in a location with plenty of space for proper ventilation, cooling air flow and accessibility. Do not install or operate a gasoline engine compressor in a confined area.

AMBIENT TEMPERATURE CONSIDERATIONS

Ideal operating temperatures are between 32°F and 100°F (0°C and 37.8°C). If temperatures consistently drop below 32°F (0°C), install the compressor in a heated area. If this is not possible, you must protect safety/relief valves and drain valves from freezing. If temperatures are consistently below 40°F (4.4°C), consider installing an external crankcase heater kit, especially if the compressor has difficulty starting.

⚠ CAUTION

Never operate the compressor in temperatures below -15°F (-26.1°C) or above 125°F (51.0°C).

HUMID AREAS

In frequently humid areas, moisture may form in the pump and produce sludge in the lubricant, causing running parts to wear out prematurely. Excessive moisture is especially likely to occur if the compressor is located in an unheated area that is subject to large temperature changes.

Two signs of excessive humidity are external condensation on the pump when it cools down and a "milky" appearance in petroleum lubricant.

You may be able to prevent moisture from forming in the pump by increasing ventilation, operating for longer intervals or installing an external crankcase heater kit.

NOISE CONSIDERATIONS

Consult local officials for information regarding acceptable noise levels in your area. To reduce excessive noise, use vibration isolator pads or intake silencers, relocate the compressor or construct total enclosures or baffle walls.

MOUNTING

⚠ WARNING

Remove the compressor from the skid before mounting. Refer to the RECEIPT & INSPECTION section of this manual for information on lifting and handling the compressor.

NOTICE

- **Local codes may mandate specific mounting requirements including, but not limited to, the use of vibration isolation mounts or pads. Mounting kits including vibration isolation mounts or pads may be ordered through your Ingersoll Rand dealer if not included with the compressor. Consult your local Ingersoll Rand dealer for more information.**
- **Secure the compressor to a solid, flat and level mounting surface.**
- **If vibration isolation mounts or pads are included with your compressor, they must be properly installed. Failure to install the compressor using the vibration isolation mounts or pads provided with the compressor and in accordance with the installation instructions may result in mechanical failure to the compressor and cancellation of warranty coverage.**
- **Do not install the compressor on I-beams, open-grid flooring systems, or non-solid surfaces.**
- **Ingersoll Rand shall bear no responsibility for equipment installed on non-approved vibration isolation mounts or pads or non-solid surfaces.**

CONCRETE FLOORS (ELECTRIC MOTOR OR GASOLINE ENGINE POWERED COMPRESSORS)

To mount the compressor to a concrete surface, use the following procedure:

1) Mark the location of the mounting holes.
2) Drill 2-1/4" deep holes using a concrete drill bit sized per the following table.

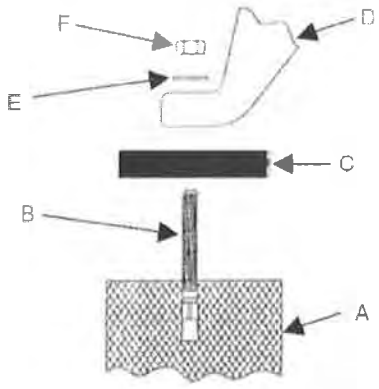
Tank Size (Gal.)	Drill Bit Size (In.)
≤ 120	1/2
≥ 240	5/8

NOTICE

It may be helpful to use a piece of tape on the drill bit to mark the proper depth.

3) Drill a hole through the center of each isolation pad (if supplied or mandated by local codes).
4) Drive the anchors into the mounting holes with the threaded portion up.
5) Place the isolation pads over the anchors as shown in the illustration below.
6) Position the compressor over the drilled holes and slowly lower the compressor feet over the holes.
7) Install the foundation bolts.
8) Install the nuts and torque each in a criss-cross pattern to 10 ft. lb.

Typical Mounting



A = Mounting surface

B = Foundation bolt / anchor

C = Isolation pad (if supplied or required by local codes)

D = Compressor mounting foot

E = Washer

F = Nut

After all mounting nuts are installed, check for receiver stress by loosening each nut individually to check for upward movement of the foot. Upward movement indicates the requirement for an appropriately sized metal shim to fill in the open elevation under the foot. After all required shims have been inserted, re-tighten the nuts to 10 ft. lb.

Do not secure uneven feet tightly, as this will cause excessive stress on the receiver tank.

TRUCK BEDS (GASOLINE ENGINE POWERED COMPRESSORS ONLY)

Gasoline engine compressors mounted on truck beds must be fastened securely without applying excessive stress on the receiver tank. Follow the general instructions for concrete floor installation in this section using appropriate mounting hardware.

AIR INLET CONNECTIONS

⚠ CAUTION

Do not operate the compressor without air inlet filtration.

If the air around the compressor is relatively free of dirt, install the air inlet filter(s) at the inlet connection(s) at the compressor. If the air is dirty, pipe the filter(s) to a source of clean air. Refer to the manual on the CD for remote air inlet requirements.

AIR DISCHARGE CONNECTIONS

⚠ WARNING

Do not use plastic pipe, soldered copper fittings, rubber hose, or lead-tin soldered joints anywhere in the compressed air system. All hoses, piping, fittings, air receiver tanks, etc. must be certified safe for at least the maximum working pressure and temperature of the compressor.

DO NOT USE PVC PLASTIC IN THE COMPRESSED AIR DISCHARGE LINE.

⚠ CAUTION

If you will be using synthetic compressor lubricant, all downstream piping material and system components must be compatible. Refer to the following material compatibility list. If there are incompatible materials present in your system, or if there are materials not included in the list, contact Ingersoll Rand for recommendations.

SYNTHETIC COMPRESSOR LUBRICANT MATERIAL COMPATIBILITY LIST

SUITABLE

Viton®, Teflon®, Epoxy (Glass Filled), Oil Resistant Alkyd, Fluorosilicone, Fluorocarbon, Polysulfide, 2-Component Urethane, Nylon, Delrin®, Celcon®, High Nitrile Rubber (Buna N. NBR more than 36% Acrylonitrile), Polyurethane, Polyethylene, Epichlorohydrin, Polyacrylate, Melamine, Polypropylene, Baked Phenolics, Epoxy, Modified Alkyds (® indicates trademark of DuPont Corporation)

NOT RECOMMENDED

Neoprene, Natural Rubber, SBR Rubber, Acrylic Paint, Lacquer, Varnish, Polystyrene, PVC, ABS, Polycarbonate, Cellulose Acetate, Low Nitrile Rubber (Buna N. NBR less than 36% Acrylonitrile), EPDM, Ethylene Vinyl Acetate, Latex, EPR, Acrylics, Phenoxy, Polysulfones, Styrene Acrylonitrile (San), Butyl

NOTICE

All compressed air systems generate condensate which accumulates in any drain point (e.g. tanks, filters, drip legs, aftercoolers, dryers). This condensate contains lubricating oil and/or substances which may be regulated and must be disposed of in accordance with local, state, and federal laws and regulations.

GENERAL REQUIREMENTS

- **Use flexible piping at the compressor's discharge connection.**
- **Use hard-welded or threaded steel or copper pipes and cast iron fittings along the remaining air discharge line.**
- **Slope the piping downward in the direction of airflow to permit condensate to drain properly.**
- **Use pipe thread sealant on all threads, and secure joints tightly to prevent air leaks.**

ELECTRICAL CONNECTIONS

PERMANENTLY CONNECTED ELECTRIC COMPRESSORS

⚠ WARNING

Electrical installation and service must be performed by a qualified electrician who is familiar with all applicable electrical codes.

GENERAL. The motor rating, as shown on the motor nameplate, and the power supply must have compatible voltage, phase and hertz characteristics.

WIRE SIZE. The electrical wiring between the power supply and electric motor varies according to motor horsepower and other factors. Install adequately sized power leads to protect against excessive voltage drop during start-up. Refer to the applicable electric codes in your area for information on selecting the proper wire size and securing electrical connections. If you connect additional electrical equipment to the same circuit, consider the total electrical load when selecting the proper wire size. DO NOT USE UNDERSIZE WIRE.

MAGNETIC STARTER. If the motor installed on your compressor has *a motor reset button, it does not require a magnetic starter.* If the motor does not have this button and the compressor does not have a factory-installed starter, install a magnetic starter with thermal overload protection. Follow the manufacturer's instructions for installation. **Ingersoll Rand** cannot accept responsibility for damages arising from failure to provide adequate motor protection.

FUSES. Refer to applicable local codes to determine the proper fuse or circuit breaker rating required. When selecting fuses, remember the momentary starting current of an electric motor is greater than its full load current. Time delay or "slow-blow" fuses are recommended.

GROUNDING. In the event of an electrical short circuit, grounding reduces the risk of electric shock by providing an escape wire for the electric current. Ground terminals are identified with a ground symbol and/or the letters "G", "GR" or "PE" (Potential Earth).

Ground Symbol

Compressors equipped with motor starters include a ground terminal inside the starter enclosure. For compressors with single-phase motors having thermal overload protection and no motor starter, the ground terminal is located inside the pressure switch. Ground must be established with a grounding wire sized according to the voltage and minimum branch circuit requirements printed on the compressor specifications decal. Ensure good bare metal contact at all grounding connection points, and ensure all connections are clean and tight.

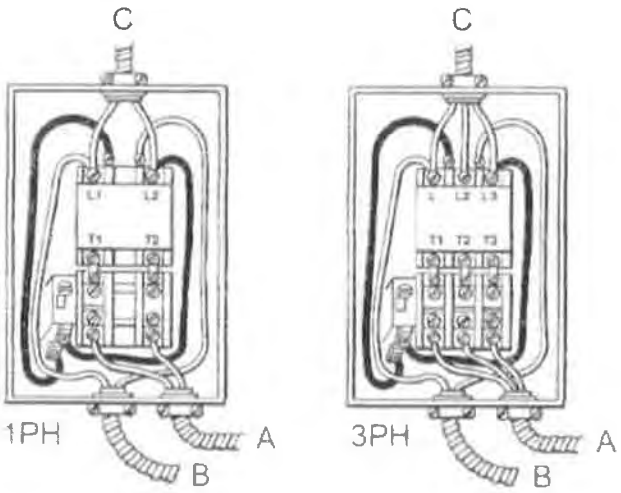
⚠ WARNING

Improper grounding can result in electrical shock and can cause severe injury or death. This product must be connected to a grounded, metallic, permanent wiring system or an equipment-grounding terminal or lead. All grounding must be performed by a qualified electrician and comply with applicable electric codes.

NOTICE

Verify grounding connections after initial installation and periodically thereafter to ensure good contact and continuity has been maintained. Consult with a qualified electrician or service technician if the grounding instructions are not completely understood, or if in doubt as to whether the product is properly grounded.

Starter Wiring



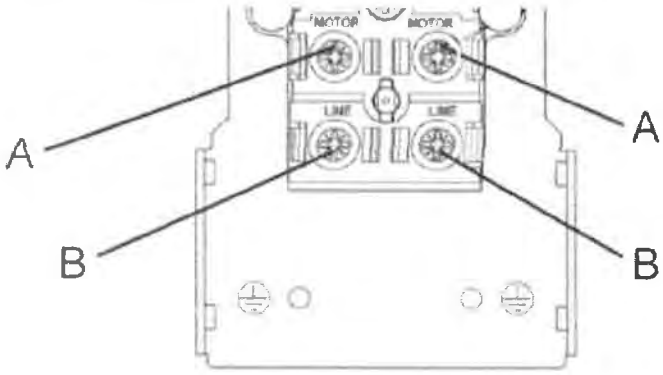
A – To/from motor (factory connection)

B – To/from pressure switch (factory connection)

C – To/from power supply (customer connection)

Ground wires not shown for clarity. Equipment must be properly grounded.

Pressure Switch Wiring (For Compressors Not Requiring a Starter)



A – To/from motor (factory connection)

B – To/from power supply (customer connection)

Ground wires not shown for clarity. Equipment must be properly grounded.

GASOLINE ENGINE COMPRESSORS

NOTICE

If you will be making connections to a remote battery, the engine on the compressor must be equipped with an alternator.

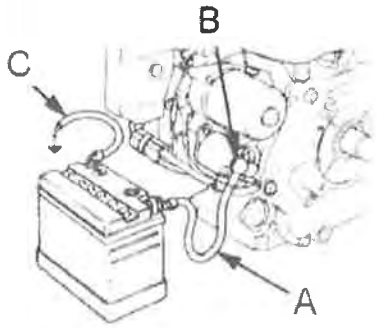
BATTERY. A 12 volt battery with a minimum current rating of 250 CCA (cold cranking amps) and minimum ampere-hour rating of 24 Ah should be sufficient for cranking most electric start engines.

BATTERY CABLES. Refer to the following table for size and length recommendations.

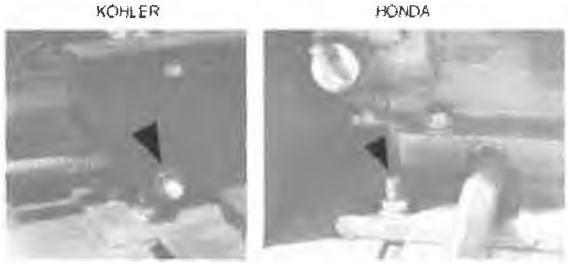
Cable Size (GA)	Maximum Length
6	5' (1.5 m.)
4	7'-2.5" (2.1 m.)
2	12' (3.6 m.)

CONNECTION PROCEDURES:

1) Connect the battery positive (+) cable (A) to the starter solenoid terminal (B).



2) Connect the battery negative (-) cable (C) to the bolt shown in the following illustration. Secure the wire in place by screwing a suitably-sized nut onto the bolt and down onto the terminal.



3) Connect the battery positive (+) cable (A) to the battery positive (+) terminal.

4) Connect the battery negative (-) cable (C) to the battery negative (-) terminal.

5) Coat the terminals and cable ends with corrosion-preventive grease.

⚠ WARNING

Remove the cable from the negative (-) side of the battery before servicing.

Refer to the engine manufacturer's instructions for more information.

COMPRESSOR LUBRICATION

⚠ CAUTION

Do not operate without lubricant or with inadequate lubricant. Ingersoll Rand is not responsible for compressor failure caused by inadequate lubrication.

RECOMMENDED LUBRICANT

Ingersoll Rand *recommends All Season Select® synthetic lubricant* from startup. If you decide to use an alternate lubricant, refer to the main owner's manual on the CD for specifications.

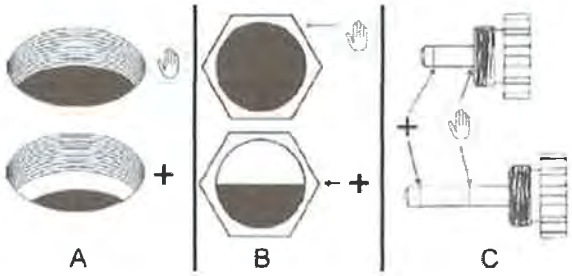
FILLING PROCEDURES

1) Unscrew and remove the oil fill plug.
2) Fill the crankcase with lubricant.
3) Replace the oil fill plug HAND TIGHT ONLY.

CAUTION

Do not remove the oil fill plug while the compressor is running.

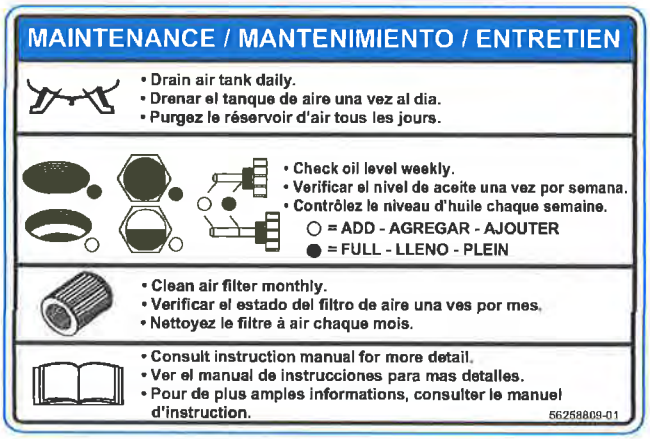
Use one of the following methods illustrated to determine when the crankcase is full.



A = Oil fill opening, B = Sight glass, C = Dipstick

OPERATION

DAILY PRE-OPERATION CHECKS



- Drain condensate from air tank
- Check oil level(s) of compressor and engine (if applicable)
- Check cleanliness of air filter(s)

START-UP (ELECTRIC MOTOR DRIVEN COMPRESSORS)

1) Close the service valve.
2) Apply power to the compressor. If the pressure switch is equipped with an "ON/AUTO-OFF" lever, flip the switch to the "ON/AUTO" position. If the compressor is equipped with a control panel "ON/OFF" switch, move the switch to the "ON" position.
3) Slowly open the service valve.

CAUTION

Unusual noise or vibration indicates a problem. Do not continue to operate until you identify and correct the source of the problem.

NOTICE

Ensure the direction of rotation is correct per the arrow on the motor or on the beltguard above the motor. If the rotation is incorrect on threephase compressors, disconnect the main power and contact a qualified electrician to interchange any two of the three leads per the ELECTRICAL CONNECTIONS section of this manual.

COMPRESSOR CONTROLS (ELECTRIC MOTOR COMPRESSORS)

AUTOMATIC START & STOP CONTROL.

NOTICE

Automatic Start & Stop Control is intended for use when the motor will start no more than 6 times per hour.

When the receiver tank pressure reaches the factory preset maximum pressure, the pressure switch stops the compressor. When the receiver tank pressure drops below the factory preset minimum, the pressure switch resets and restarts the compressor.

DUAL CONTROL. Select either automatic start and stop control or constant speed control by adjusting the knob on the auxiliary valve. For automatic start and stop control, turn the knob on the auxiliary valve fully clockwise to disable the auxiliary valve. The pressure switch *will then start and stop the compressor.*

Auxiliary Valve

NOTICE

For dual control compressors, automatic start and stop is preferred.

Select constant speed control if the compressor restarts in less than 10 minute intervals or runs more than 40 minutes per hour. Turn the knob fully counterclockwise to run the compressor continually.

NOTICE

The auxiliary valve is factory preset at 5 PSIG lower than the factory pressure switch setting.

CAUTION

Running unloaded for more than 20 minutes per hour or more than 15 minutes continually with the use of constant speed control will cause oil pumping and should be avoided.

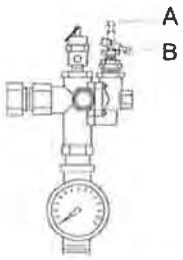
START-UP (GASOLINE ENGINE COMPRESSORS)

WARNING

Do not operate gasoline engine compressors in an enclosed area.

1) Release any residual tank pressure by slowly opening the manual drain valve.
2) Turn on the engine gasoline supply.
3) Put the choke in the "on" position.
4) Close the service valve and put the unloader lever in the "unload" (A) position.

Unloader



5) Start the engine, release the choke, and allow the engine to warm up for two to three minutes.
6) Return the unloader lever to the "load" (B) position.

NOTICE

Turn the gasoline supply off when the compressor is not being used.

NOTICE

Some gasoline engine driven compressors require 5-8 break-in hours of operation before reaching full capacity and speed.

COMPRESSOR CONTROLS (GASOLINE ENGINE COMPRESSORS)

CONSTANT SPEED CONTROL. This type of control applies to gasoline engine compressors.

When the receiver tank pressure reaches the factory preset maximum pressure, the unloader slows down the engine and the compressor stops pumping. When the receiver tank pressure drops to the factory preset minimum, the unloader resets, the engine returns to full speed, and the compressor resumes pumping.

USING THE CD

The CD included with the compressor contains detailed installation, operation, maintenance, troubleshooting and repair parts information not covered in this manual. To use the CD, insert it into your computer. An easy to- follow index will help you find the publications you need.

The files are viewable with Adobe Reader. Adobe Reader installation files are included on the CD.

If you wish to order paper copies of any of the documents on the CD, contact your local **Ingersoll Rand** dealer.

MATERIAL SAFETY DATA — ALL SEASON SELECT®

Effective Date: 01/01/2009

ALL SEASON SELECT is a diester based synthetic lubricant formulated for use in **Ingersoll Rand** reciprocating air compressors.

1. PRODUCT IDENTIFICATION:

Mixture-Chemical Family: Diester

2. HAZARDOUS INGREDIENTS:

The components of this product are not listed as hazardous or toxic according to OSHA (29 CFR OSHA 1910.1200), NTP, IARC and SARA 313.

Hazardous Materials Identification System (HMIS):

Health Flammability Reactivity Basis Hazard Ratings Key:

0 1 0 - 4 = Highest 0 = Lowest

3. PHYSICAL DATA:

Boiling Point: N/A

Pour Point: -40°F

Viscosity: 96.9 cSt @ 40°C

Specific Gravity: 0.92

Vapor Density: Greater than air

Percent Volatile: Negligible

Solubility in Water: Negligible

Evaporation Rate: Not volatile, slower than Butyl

Appearance: Light straw coloured fluid Acetrate

Odor: Mild ester odor

4. FIRE AND EXPLOSION HAZARD DATA:

Flash Point: 480°F (249°C)

Method Used: ASTM D92

Flammable Limits: Not established

Fire Fighting Media: Water spray, dry chemical, foam or carbon dioxide
Fire Fighting Procedures: Use water to keep fire-exposed container cool.

Wear self-contained positive pressure breathing apparatus and full protective gear to fight fire. Cool with water spray.

Special Fire and Explosion Hazard: None expected

5. HEALTH HAZARD:

This product does not contain any components considered to be health hazards under the OSHA Hazard Communication Standards 29CFR 1910.1200 or under the WHMIS Controlled Product Regulations in Canada.

Effects on exposure: Prolonged or repeated skin contact may tend to remove natural skin oils, thus leading to possible irritation and dermatitis. Medical Conditions Generally Aggravated by Exposure: May aggravate previous skin condition.

Skin Contact: With repeated contact, a skin defatter. May develop redness or mild irritation.

Skin Absorption: Not established

Ingestion (Acute): Can cause gastrointestinal irritation. No hazard expected in normal use.

Eyes: Mild irritation.

Systemic & Other Effects: Not established

6. REACTIVITY DATA:

Stability: Stable under normal storage conditions

Incompatibility: Avoid contact with strong oxidizers such as liquid chlorine, concentrated oxygen, sodium hypochlorite or calcium hypochlorite.

Hazardous Decomposition: Burning will produce toxic fumes.
Hazardous Polymerization: Will not occur under normal conditions
Conditions to Avoid: Open flames

7. HANDLING AND STORAGE:

Exposure Guidelines: Not Established. OSHA TLV/TWA 5mg/m^3 oil mist can be used.
Ventilation: Local exhaust to capture vapor, mist or fumes, if necessary.
Respiratory Protection: Use NIOSH-approved equipment: filter, fume or mist respirator under misty conditions.
Skin Protection: For prolonged use, use chemical resistant gloves to minimize skin contact.
Eye Protection: Use safety glasses with side shields.
Special Handling: If splashing occurs, use apron. Do not get in eyes, on skin or clothing. Wash thoroughly after handling.
Storage: Store in a cool, dry place. Keep containers closed when not in use.

8. ENVIRONMENTAL AND DISPOSAL INFORMATION:

Steps to be Taken in Case of Spills: Ventilate area. Prevent spread of spill. Absorb with sand or an inert, absorbing material. Sweep or scoop up and place in a disposal container. Do not contaminate any lakes, ponds, streams, ground water or soil. Waste Disposal Method: Dispose of in accordance with local, state or federal laws.

9. FIRST AID:

Eyes: Flush with water for at least 15 minutes. Hold eyelids open while flushing. If irritation persists get medical attention.
Skin: Remove contaminated clothing and wash skin thoroughly with soap and water.
Ingestion: Drink 8-10 ounces of water. Do not induce vomiting. Get medical attention immediately.
Inhalation: Remove to fresh air. Get medical attention if discomfort persists.

10. PREPARED BY: INGERSOLL RAND

NOTE : This information is furnished without warranty, representation, inducement or license of any kind, except that it is accurate to the best of **Ingersoll Rand**'s knowledge or obtained from sources believed by ***Ingersoll Rand*** *to be accurate, and* ***Ingersoll Rand*** *does not assume* any legal responsibility for use or reliance upon same. Customers are encouraged to conduct their own tests. Before using any product, READ ITS LABEL.

Emergency Contact:

Telephone: 704/896-4500

Telex: 572584 IRACDSN DVDS

800-B Beaty Street

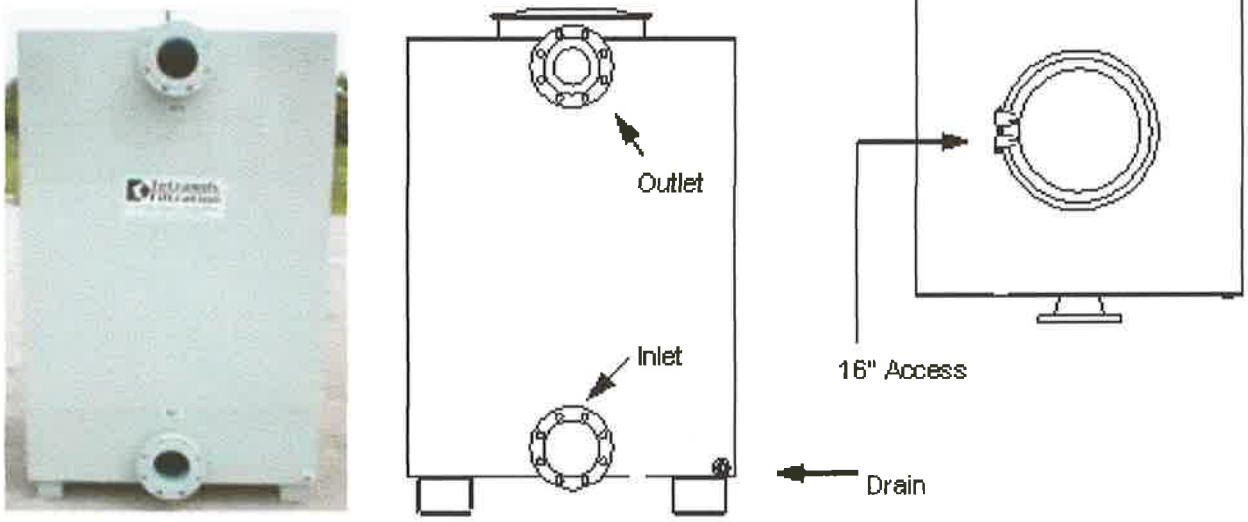
Davidson, NC 28036

APPENDIX F

geotech

Submittal:
Vapor Phase Carbon Vessel

Order # 424225
Customer Name: DOT Energy Solutions



Rev 2/19/2015

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DOCUMENTATION CONVENTIONS

This uses the following conventions to present information:

WARNING

An exclamation point icon indicates a **WARNING** of a situation or condition that could lead to personal injury or death. You should not proceed until you read and thoroughly understand the **WARNING** message.

CAUTION

A raised hand icon indicates **CAUTION** information that relates to a situation or condition that could lead to equipment malfunction or damage. You should not proceed until you read and thoroughly understand the **CAUTION** message.

NOTE

A note icon indicates **NOTE** information. Notes provide additional or supplementary information about an activity or concept.

Section 1: Carbon Media Specifications

Stags CVR is a highly activity carbon thas is produced in the newest reactivation facility in the United States. The new state of the art facility produces consistent high quality carbon for the end user. The recycled material can be used to remove a wide variety of imopurities from the vapor stream.

Specifications:

Ball Pan Hardness	95
Carbon Tetrachloride Activity	55 min (g/100g)
Iodine Number	950mg/g
Apparent Density	0.48-0.52 g/cc
	28-30 lbs/ft^3
Total Surface Area	1050 m^2/g
Moisture	5% max
Mesh Size +4	less than 5%
Mesh Size -10	Less than 10%

Section 2: Vessel Description

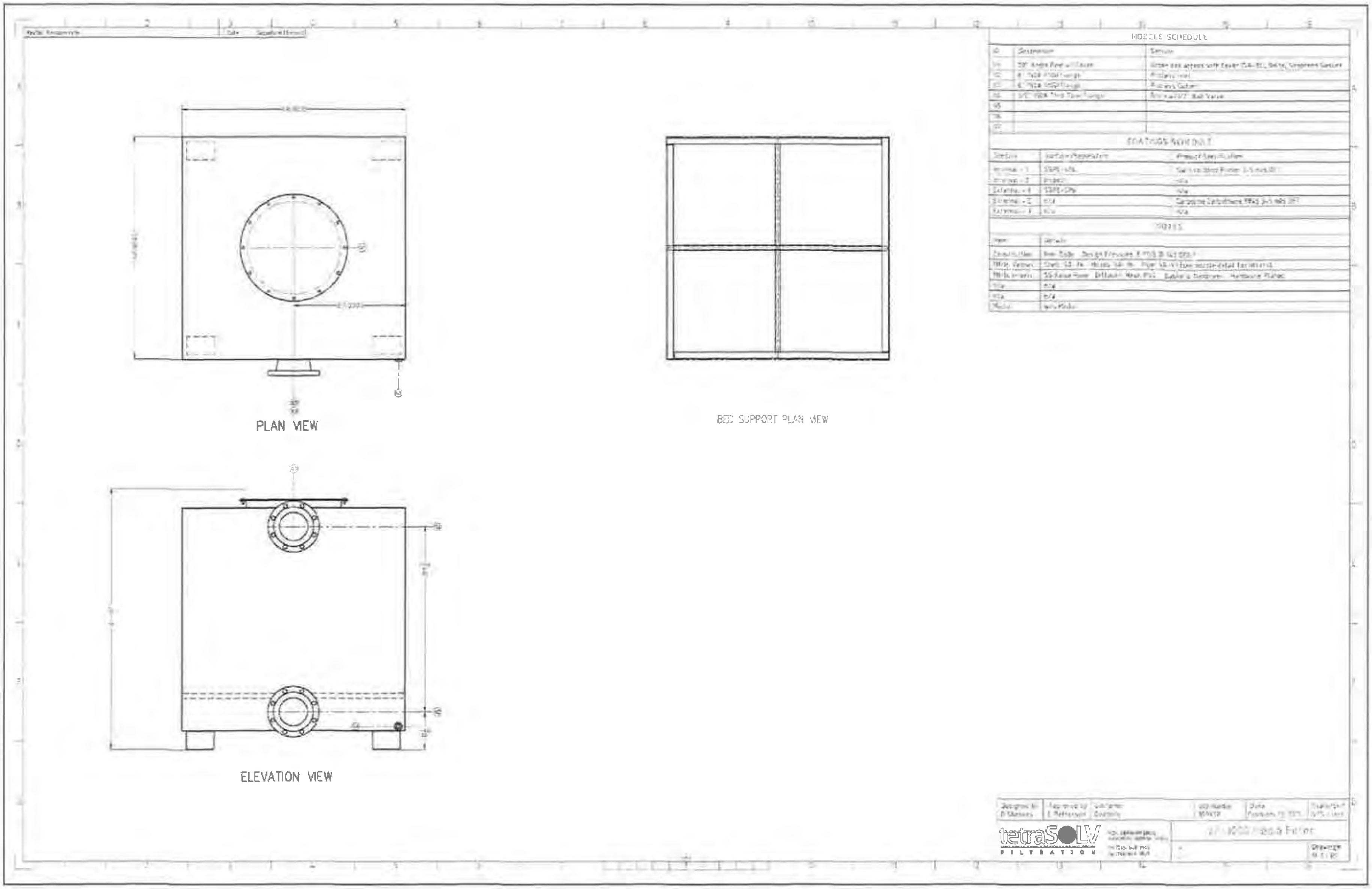
The GAC V-1000 (VF-1000) filter is a media filter vessel designed to treat vapor streams where pressure drop is a strong concern. While the typi8cal design application is an activated carbon absorption unit, the filter can easily accommodate many medias. The sturdy construction makes these filter vessels ideal for long term treatment units.

Specifications:

Overall Height	4'8"
Footprint	4' x 4'
Inlet/Outlet	6" (150 # FLNG)
Drain/Vent	½"
GAC Fill	1000 lbs.
Vessel/Internals Piping Materials	CS/CS (False Floor)
External Coating	Epoxy Mastic (Light Grey)
Internal Coating	Polyamide Epoxy Resin
Maximum Pressure/Temp	3 PSIG / 250°F
Cross Sectional Bed Area	16 FT^2
Bed Depth/Volume	2.2 FT / 36 FT^3
Shipping/ Operational Weight	1450 / 1600 lbs.

Pressure Drop

Flow Rate (CFM)	Pressure Drop (in IN.W.C.)
250	1.5
500	2.5
750	5
1000	10
1500	22


PLAN VIEW
BED SUPPORT PLAN VIEW
ELEVATION VIEW
NOZZLE SCHEDULE
NOTES
tetraSOLV
FILTRATION

Section 3: Manufacturer's O&M Manual

Tetrasolv Filtration

Liquid & Vapor Filtration
Remedial • Industrial • Municipal

Operation & Maintenance Manual

VFD • VFV • VF • VR SERIES

Tetrasolv Filtration Vapor Filters

CONTENTS

1.0 GENERAL DESCRIPTION

The liquid series filters utilize fixed bed filtration to treat vapor. The filters employ a variety of medias to remove or catalyze contaminants. Flow through the filter may be either up flow or down flow depending upon the media supplied and the operation parameters. Generally inlet and outlet locations are indicated on the filter and or the filter drawings.

The most common application utilizes activated carbon as the adsorption media. Typically vapor which contains low levels of organic contaminants flows upward through the column of activated carbon where the larger organic molecules adhere to the porous structure of the activated carbon granules. This adsorption begins at the bottom of the "bed" and continues upward as the original adsorptive area becomes saturated.

Complete saturation of the carbon is dependent upon many factors such as contaminant levels, temperature, compounds being adsorbed, humidity, etc. Typically a carbon isotherm has been run on the influent stream to determine the expected rate of consumption of the activated carbon media. When monitoring has determined discharge air no longer meets discharge requirements the carbon will have to be removed and replaced ***(refer to section 5.0)***.

2.0 SAFETY CONSIDERATIONS

It is important that the entire O&M manual be read prior to set up and operation of the carbon system. If you have any questions please contact Tetrasolv Filtration at the number listed below or support@tetrasolv.com.

- ***WARNING: Where system pressure may exceed design pressure we strongly recommend the use of a relief device. Exceeding the maximum pressure of the filter could result in catastrophic failure***

of the vessel.

- Always adhere to "lockout/tagout" procedures when servicing the system.

- Wear appropriate safety equipment when operating system.

- ***WARNING: Wet or dry activated carbon preferentially removes oxygen from air. In closed or partially closed containers, oxygen depletion may reach hazardous levels. If workers must enter a container containing carbon, appropriate sampling and work procedures should be followed for potentially low-oxygen spaces - including all applicable federal and state requirements.***

- ***WARNING: High concentrations of certain compounds such as BETX and low concentrations such as ketones, aldehydes, organic acids and sulphur may cause severe temperature rises.***

- Understand the potential hazards of the stream being treated by the system. The activated carbon may contain higher concentrations of the contaminants being adsorbed than is in the influent stream. In addition the carbon may be considered hazardous material and therefore may require specific handling precautions unknown to Tetrasolv Filtration.

3.0 INSTALLATION

3.1 Shipment

Typically filters are shipped with media installed. However, in certain instances media is shipped to the site to be installed after installation. In very large systems it may be advisable to not install the media until adsorbers have been placed into final position and secured.

3.2 Unloading

Refer to the product data sheet for weight information for appropriate sizing information for the equipment to be used.

All components should be lifted either by crane or forklift as designated by the model.

- ***WARNING: Failure to follow the procedures outlined below can result in catastrophic damage to the system.***

Crane Lift - If a crane lift is to be used we recommend the following method. A "spreader" equaling 75% of the distance between the opposing lifting eyes on each adsorber should be used to insure proper lifting force direction. Attach an appropriately sized spreader beam and lifting cables to each lift eye of the component. The use of an experienced crane operator and quality equipment is highly recommended.

Fork-Lift - When using a forklift we recommend that the fork tubes on the filter be used or a pallet if the unit was shipped on a pallet.

3.3 Inspection

Perform the following inspections after un-loading the system. Note any discrepancies and contact TetraSolv immediately.

- Check the vessel exterior for damage which may have occurred during shipment. Inspect the support structures and piping support for damage.

- Inspect the piping system for damage. Insure the valves operate properly. Check installed instruments and instrument installation points for damage.

- If the filters are shipped without carbon visually inspect the interior of the vessel for damaged internals.

- Inspect the carbon discharge, drain and vent valves for damage

3.4 Set Up

The filter should be placed on a level concrete pad of appropriate thickness to support the system at it's maximum operational weight. The filter should be secured to the pad using appropriately sized anchor bolts.

Connect the site piping to the filter inlet and outlet connection points. It is important that all piping connected to the filter should be self supported. We also recommend in hard pipe installation that a flexible joint be used to further insulate the filter from vibration and stress.

Connect any gauges and instrumentation shipped

loose with the system.

The outlet piping if connected to a stack or vent should be designed to prevent the introduction of water or debris into the adsorber piping. Discharge piping should be sized equal to or greater than the diameter of the system piping or back pressure could occur creating excess pressure drop on the system.

Flowrates greater than 60 cfm / sq ft can produce bed fluidization in vapor phase filters. When this occurs carbon granules can be lifted and propelled out of the carbon bed in up-flow applications. In extreme cases large amounts of carbon can be expelled. If the system will be operating near or greater than the amount stated above please contact Tetrasolv for recommendations.

Carbon filters can be manifold in parallel operation for higher flowrates. Series operation is the preferred method of operation as it provides for the greatest degree of bed utilization.

Vapor conditions such as high humidity and high temperature (> 125° F) can cause inefficient adsorbtion to occur. If these conditions exist contact Tetrasolv for support. Also, any free water or product and debris should be eliminated with a knockout filter prior to the vapor stream entering the system. Many other vapor issues may effect Adsorber operation and we therefore recommend you discuss your specific installation with a representative.

4.0 OPERATION

4.1 Modes of Operation

With certain applications (2) filters in series flow are utilized. Listed below are typical operational modes.

- Shutdown - Both filters completely off-line and isolated.
- Series Flow - Influent enters primary filter and exits through secondary adsorber (this is the *preferred method of operation*)
- Isolation Flow - Only one filter is receiving influent. This mode is typically used when the operator is maintaining the off-line filter.
- Parallel Flow - Both filters are receiving the influent as the primary. Flow is split equally between the filters. This mode is used when higher flow rates need to be achieved and contact times are not critical.

4.3 Monitoring

Adsorber units only require periodic monitoring if properly installed. The following items may be monitored:

Pressure: Check inlet and outlet pressure. Increase in pressure differential may indicate media breakdown or presence of high moisture. Rapid increase in pressure drop could indicate adsorber failure.

Samples: Inlet and outlet sample points if provided for vapor analysis to determine system performance.

5.0 ADSORBER SERVICING

The Adsorber may be serviced on-site using a vacuum removal method. Prior to servicing the unit should be closed off from influent and effluent lines and any electrical devices or connections should be tagged off.

After removal of the spent carbon is complete, it is recommended that the inside of the Adsorber be checked thoroughly and any minor maintenance conducted.

5.1 Carbon Loading - Bulk Bag

- ***WARNING - Dry activated carbon generates considerable dust. While activated carbon poses no health risk the dust can cause respiratory irritation and occasional skin rash. Therefore we recommended the use of proper clothing and dust mask during filling operation.***

Hoist the bag over the manway and untie the outer bag exposing the inner chute. Untie the inner chute while clasping it shut. Remain holding the chute and carefully lower the chute into the manway. Un-clasp the chute and allow the carbon to discharge from the sack. The carbon should flow out very quickly and completely. When finished shake the bag and invert the chute into the bag.

If at any time you wish to stop the flow of carbon simply re-grasp the chute up high and cinch. Re-tie the bag.

5.2 Carbon Loading - Vacuum Method

In this method dry-activated carbon will be loaded into to the adsorbers using a vacuum rig. To add the carbon to the filters use the following method:

WARNING: Due to the low vacuum rating of the VF series adsorbers (< 60" H_20) only experienced change-out personnel should attempt this method of re-filling. Exceeding the recommend vacuum rating could lead to failure of the superstructure of the vessel.

1. Connect a 3" vacuum source to the auxiliary connection of the adsorber to be filled.

2. Install a 16" bolted transfer lid onto the manway opening of the adsorber to be filled.

3. Turn on the vacuum and check for good flow of air through the adsorber. Connect the fill line to the transfer lid and lead enough hose to reach the fresh carbon source (Note: This should be as short of a distance as possible).

4. Begin vacuuming carbon into the adsorber. It is important to note that the loading method is actually conveying and not true vacuum. The hose should contain 1/3 air with the carbon. Closely view the adsorber being filled. If the adsorber is collasping in excessively take less carbon and more air. This is something from experience and cannot be adequately explained here.

5. When transfer is complete the transfer lid should be removed and the carbon in the adsorber should be leveled out to insure even pressure drop across the bed.

6. Close the manway and turn the adsorber back on.

> ***Note: When the system if first started up small amounts of fines may be present in the discharge stream. This is normal and should discontinue within a short period of time.***

6.0 MAINTENANCE

6.1 Extended Shutdown

If the system is to be shutdown for extended period of time it is recommended that the valve be placed in shutdown mode and the system water drain valve be left open.

Monitor the system closely after extended shutdown for signs of potential problems such as interior manifold failure or leaking valves and gaskets.

Section 4: Troubleshooting Guide

Service Locations

Geotech Service personnel are trained on all aspects of the equipment and are dedicated to help you maximize the efficiency and cost effectiveness of your equipment. For technical support call our Geotech Service office.

Geotech Environmental Equipment, Inc.
2650 East 40th Avenue
Denver, CO 80205
Toll Free Phone: (800) 833-7958
Commercial Phone: (303) 320-4764
Fax: (303) 322-7242
www.geotechenv.com

Getting Help

Read the entire manual and become thoroughly familiar with all system components before initiating any of the following troubleshooting procedures.

If the troubleshooting procedures in this section indicate a component failure, prepare a written list of all problems encountered while operating the equipment, then call Geotech Environmental Equipment for assistance.

The Warranty

For a period of one (1) year from date of first sale, product is warranted to be free from defects in materials and workmanship. Geotech agrees to repair or replace, at Geotech's option, the portion proving defective, or at our option to refund the purchase price thereof. Geotech will have no warranty obligation if the product is subjected to abnormal operating conditions, accident, abuse, misuse, unauthorized modification, alteration, repair, or replacement of wear parts. User assumes all other risk, if any, including the risk of injury, loss, or damage, direct or consequential, arising out of the use, misuse, or inability to use this product. User agrees to use, maintain and install product in accordance with recommendations and instructions. User is responsible for transportation charges connected to the repair or replacement of product under this warranty.

Equipment Return Policy

A Return Material Authorization number (RMA #) is required prior to return of any equipment to our facilities, please call our 800 number for appropriate location. An RMA # will be issued upon receipt of your request to return equipment, which should include reasons for the return. Your return shipment to us must have this RMA # clearly marked on the outside of the package. Proof of date of purchase is required for processing of all warranty requests.

This policy applies to both equipment sales and repair orders.

FOR A RETURN MATERIAL AUTHORIZATION, PLEASE CALL OUR SERVICE DEPARTMENT AT 1-800-833-7958.

Model Number: _____

Serial Number: _____

Date of Purchase: _____

Equipment Decontamination

Prior to return, all equipment must be thoroughly cleaned and decontaminated. Please make note on RMA form, the use of equipment, contaminants equipment was exposed to, and decontamination solutions/methods used. Geotech reserves the right to refuse any equipment not properly decontaminated. Geotech may also choose to decontaminate the equipment for a fee, which will be applied to the repair order invoice.

APPENDIX G

02500 Newberry Soil gas extraction project 2014-31

PUMPONE ENVIRONMENTAL LLC

XP4-BL - 8" FERNCO SUBMITTAL PACKAGE

Leachate & Remediation Pumping Systems

41 H Odell School Rd. Concord, NC 28027 T: 704-786-8158 F: 704-788-6814

PUMPONE ENVIRONMENTAL LLC

XP4 X-SERIES

Description:

The XP4-BL series (short) is a bottom filling , float-activated, air-powered positive displacement pump, designed for severe conditions found in landfill and remediation applications.

The XP4 is designed to operate in both simple and arduous conditions such as chemical attack, (corrosion) and elevated temperatures.

Corrosion & Temperature Resistance:

Exceptional corrosion & temperature resistance due to the highest quality materials of construction which includes:

- **316L Stainless Steel for all major metal parts & fasteners**
- **17/4 Stainless Steel for magnetic parts**
- **PEEK rocker assembly**
- **PTFE (Teflon®) discharge check valve ball**
- **UHMW PE actuator rod & inlet check valve shuttle**
- **FKM (Viton®) for all 'o'-ring seals**
- **PVDF (Kynar®) for minor plastic parts**
- **Syntactic high performance float, max. operating temp. 250°F**
- **FRP high performance filament wound fiberglass casing with integral epoxy liner, max operating temp. 210°F**
- **316L Stainless Steel casing available on request**

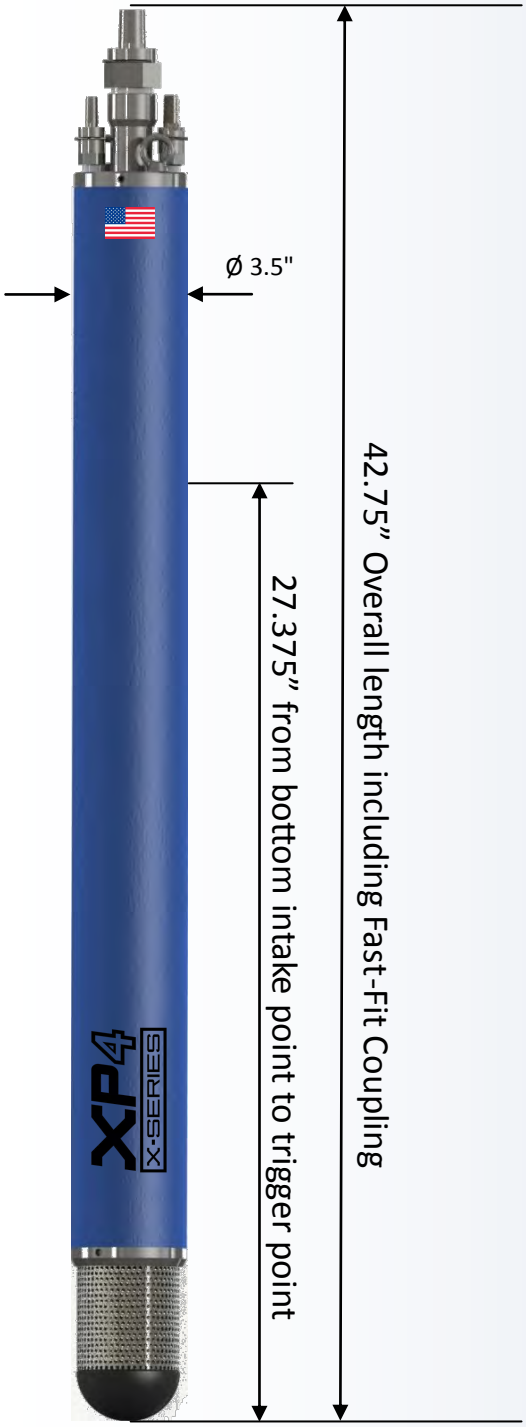
Enhanced Design:

- **Solid, machined pump head with integral discharge check valve**
- **No penetrations through the center discharge tube meaning no air leakage into discharge**
- **Solid machined bottom check valve assembly with minimal parts and easy disassembly**
- **Adjustable air and exhaust poppets**
- **Air inlet and exhaust valves secured with cotter-pins**
- **Compatible with Fast-Fit couplings or standard hose-barbs**
- **Unmatched service and support**
- **5 Year standard warranty**

Leachate & Remediation Pumping Systems

41 H Odell School Rd. Concord, NC 28027 T: 704-786-8158 F: 704-788-6814

PUMPONE ENVIRONMENTAL LLC



Specifications	
Pump Type	XP4-BL bottom loading pneumatic pump
Actuation	Float activated, fully automatic
Weight: FRP / 316 SS casing	17.2 lbs / 21.2 lbs
Volume of liquid displaced per cycle	0.32-0.37 Gallons (US)
Maximum flow rate	15.85 GPM (US)
Air pressure operating range	5 - 260 psi
Maximum operating temperature	210°F
Air consumption	0-5 SCFM
pH range	2-13
Minimum liquid density	0.7 SG

Materials	
All non metallic parts	316L Stainless Steel
Magnetic parts	17/4 Stainless Steel & NdFeB
Rocker assembly	PEEK
Discharge check valve ball	PTFE (Teflon®)
Actuator rod & inlet check valve shuttle	UHMW PE
'o'-ring seals	FKM (Viton®)
All minor plastic parts	PVDF (Kynar®)
Option on pump casing	FRP / 316 SS
Float	Syntactic high performance float, max. operating temp. 250°F
Casing	FRP high performance filament wound epoxy composite tube, max operating temp. 210°F

Down-Well Tube & Connection Options	
Tube material	High performance nylon
Discharge	1" OD
Air supply	1/2" OD
Air Exhaust	5/8" OD
Fast Fit Couplings	1", 1/2"& 5/8"
Standard hose barbs	1", 1/2" & 5/8"

Leachate & Remediation Pumping Systems

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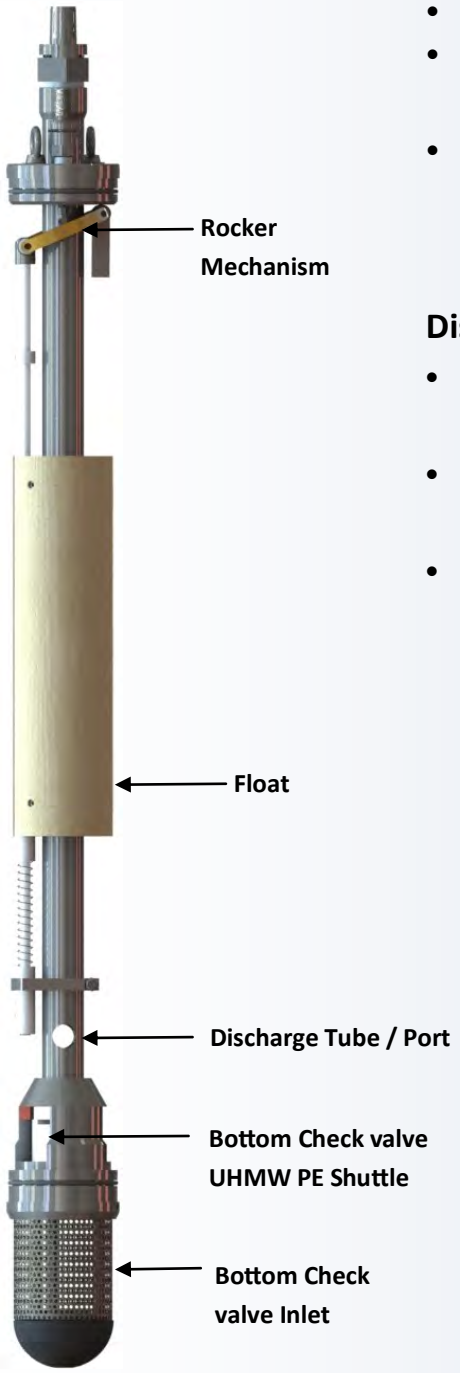
How It Works:

The XP Series pumps are air powered and require no sensors, timers, solar, or control panels. The pump is activated by an internal float that is triggered by the recharge in gas wells & condensate sumps.



Fill Cycle:

- The fluid pushes the BCV shuttle open which allows the pump to fill
- When the fluid rises, air is forced out of the pump via the air exhaust valve. As the fluid rises, so does the float, causing the rocker mechanism to trip and close the exhaust valve.
- After the pump has completely filled, and the float has tripped the rocker mechanism, the air inlet valve opens allowing air to enter the pump and pressurize the chamber of the pump.

Discharge Cycle:

- When the air inlet valve is open and the pump chamber is pressurized the BCV shuttle closes, and forces the fluid up the discharge tube through the discharge port.
- As the fluid is displaced the level will fall along with the float, causing the rocker mechanism to trip, closing the air inlet valve and opening the exhaust valve.
- The cycle repeats until the well or sump is pumped down to level.

Leachate & Remediation Pumping Systems

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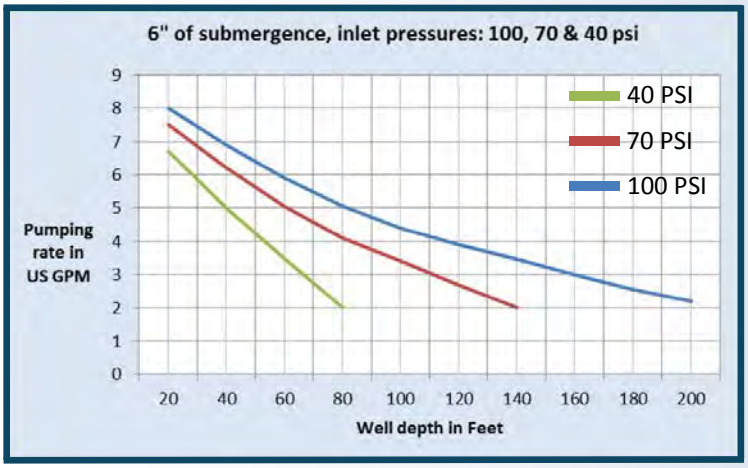
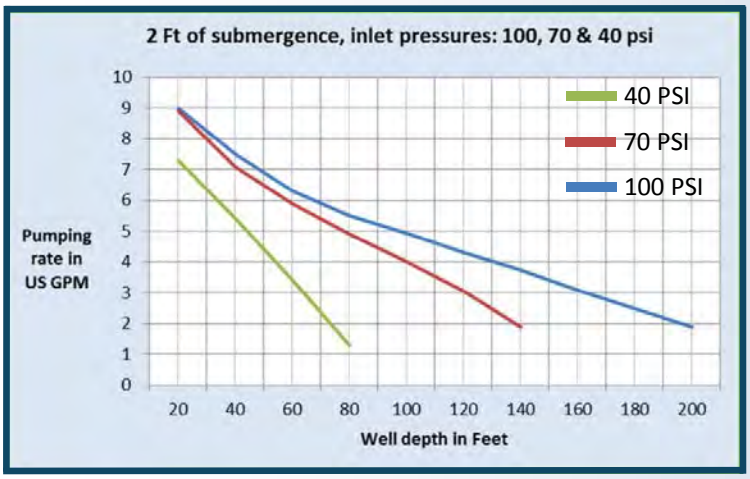
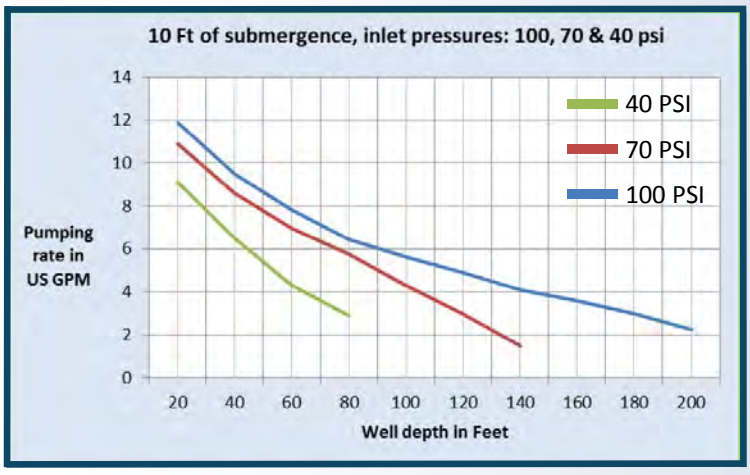
Flow performance graphs:

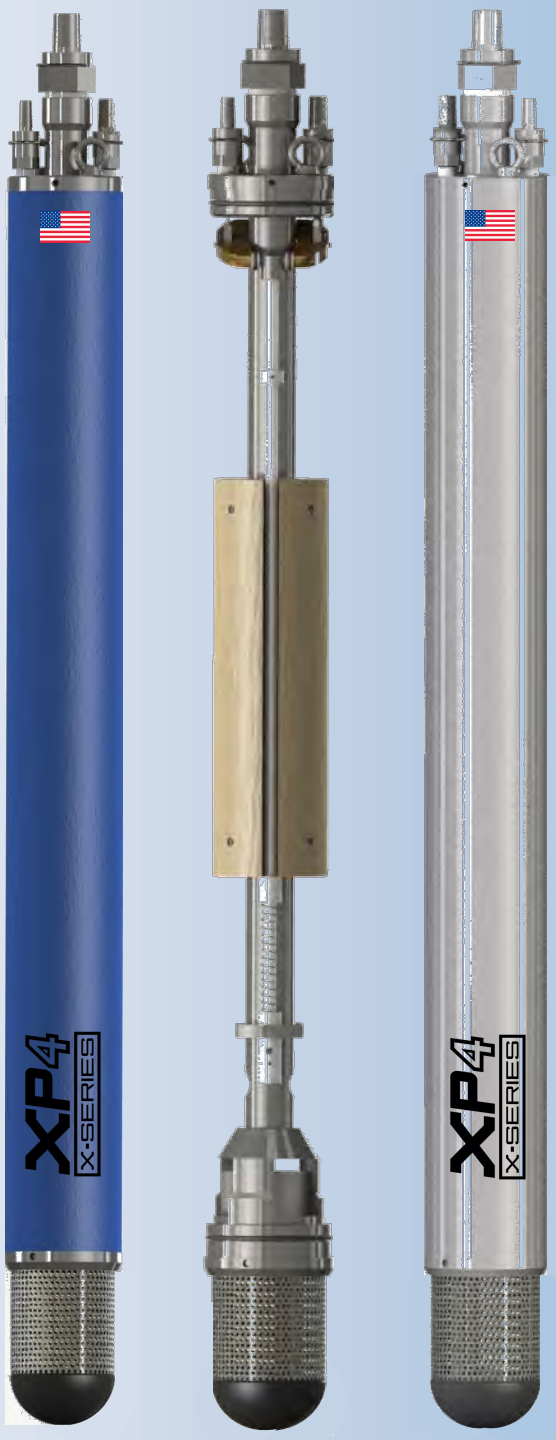
The curves are based on 1" OD discharge tubing.

Flow rates will vary with site conditions









Leachate & Remediation Pumping Systems

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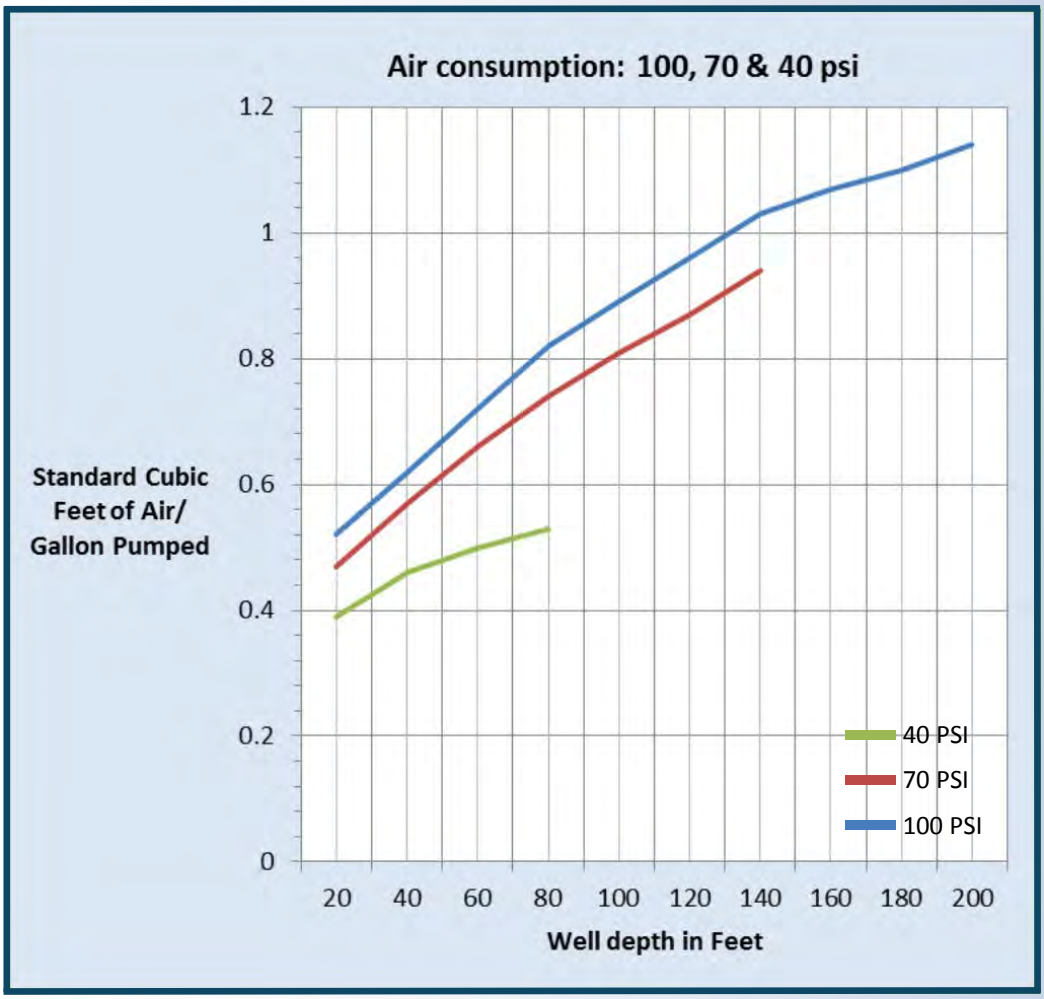
Air Consumption graph:

The curves are based on 1" OD discharge tubing.

Air consumption rates will vary with site conditions



XP4 X-SERIES

5 Year Standard Warranty

Leachate & Remediation Pumping Systems

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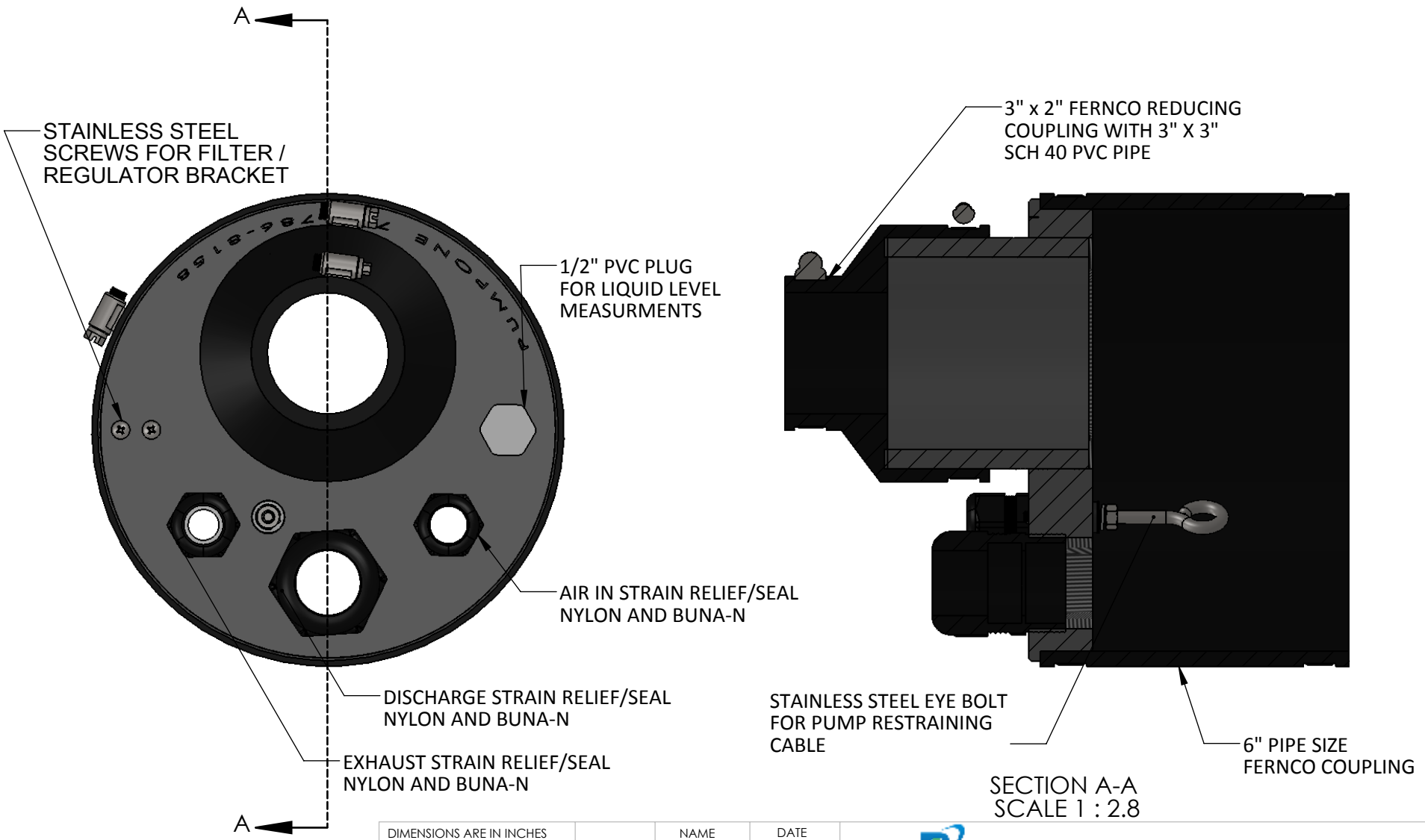

SECTION A-A
SCALE 1 : 2.8

DIMENSIONS ARE IN INCHES TOLERANCES: ANGULAR: MACH ± .5° ONE PLACE DECIMAL : ±0.050 TWO PLACE DECIMAL : ±0.010 THREE PLACE DECIMAL: ±0.005		NAME	DATE
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	DESIGNED		
	CHECKED		
MATERIAL	APPROVED		
125 FINISH UNLESS NOTED OTHERWISE	**PROPRIETARY AND CONFIDENTIAL** THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF PumpOne Environmental LLC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF PumpOne Environmental LLC IS PROHIBITED.		
DO NOT SCALE DRAWING			

PUMPONE ENVIRONMENTAL LLC

41H Odell School Road
Concord, NC 28027

TITLE / DESCRIPTION:
Well Seal - 8"x8" Fernco Well Seal Assembly

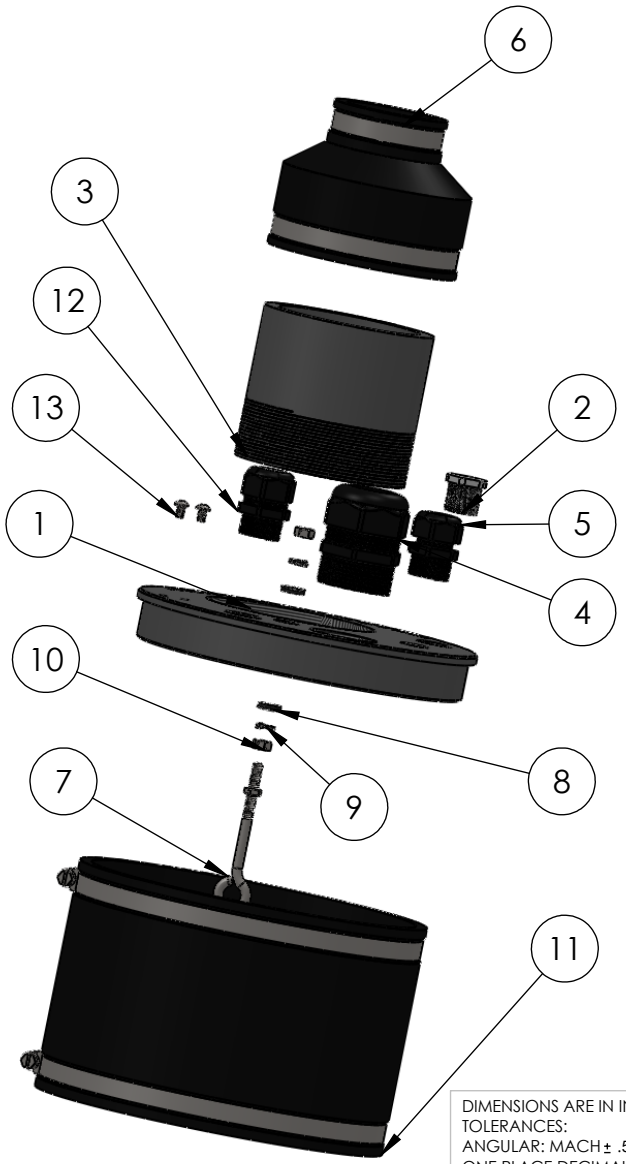
DWG. NO. 80000

REV 1

SCALE: 1:12

SHEET 1 OF 1

5 4 3 2 1



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	80001	Well Seal - 8" Well Seal for 4" Head	1
2	80003.5	Plug - 1/2" PVC Plug	1
3	80016	Nipple - 4" X 4" PVC Sch. 40	1
4	80002	Strain / Relief - 1" OD Tubing..Sealing Range - .87" - 1.26" (22 - 32 mm)	1
5	80008	Strain / Relief - 1/2" OD Tubing	1
6	80015	Fernco - 4" X 2" Fernco Coupling IPS Pipe to Pipe	1
7	80009	1/4" - 20 X 4 bent wire eye bolt	1
8	80010	1/4" Neoprene bonded flat washer 18-8 SS 5/8" OD	2
9	80011	1/4" Medium (split) Lock Washer	2
10	80012	1/4" Hex Nut	2
11	80014	8" x 8" Fernco Coupling IPS Pipe to Pipe	1
12	80007	Strain / Relief - 5/8" OD Tubing	1
13	80013	Capscrew - 1/4" - 20 X 3/8" Button Socket Cap Screw	2

DIMENSIONS ARE IN INCHES
TOLERANCES:
ANGULAR: MACH ± .5°
ONE PLACE DECIMAL : ±0.050
TWO PLACE DECIMAL : ±0.010
THREE PLACE DECIMAL: ±0.005

MATERIAL

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PUMPONE ENVIRONMENTAL LLC

41H Odell School Road
Concord, NC 28027

TITLE / DESCRIPTION:
Well Seal - 8"x8" Fernco Well Seal Assembly

DWG. NO. 80000.1

REV 1

SCALE: 1:8

SHEET 1 OF 1

5 4 3 2 1

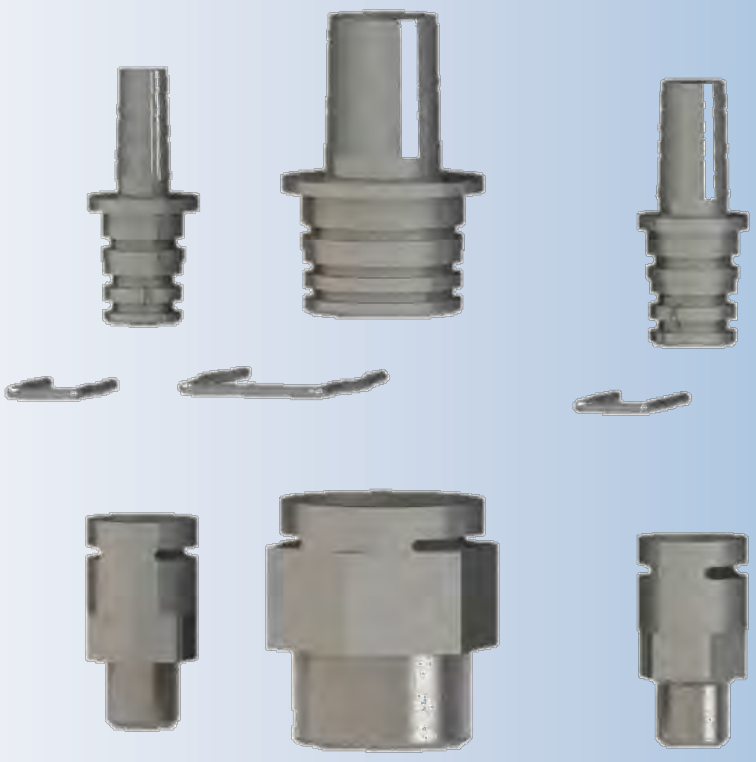
PUMPONE ENVIRONMENTAL LLC

XP Series Fast Fittings:

The XP Series Fast Fittings allows the pump to be quickly disconnected & connected from the tubing without ever having to remove or replace clamps, thus eliminating the need to cut and shorten the tubing every time the pump is pulled.

Fast Fit Specifications

- TYP 316 Stainless Steel
- Clips: Hastelloy C
- O-Rings: Viton
- Maximum Pressure: 125 p.s.i.
- No need to cut and shorten the tubing every time the pump is pulled for servicing
- No clamp replacement



Removal Instructions

- Assure air supply has been disconnected from pump
- Remove C-clips with pliers
- Pull tubing away from pump—Top barb will separate from bottom female connection which will remain in the pump

To Reinstall

- Reinsert top barb to bottom female connection in pump
- Reinsert C-clips *Note—Exhaust and Air-In C-clips differ in size and are unique to each connection

Leachate & Remediation Pumping Systems

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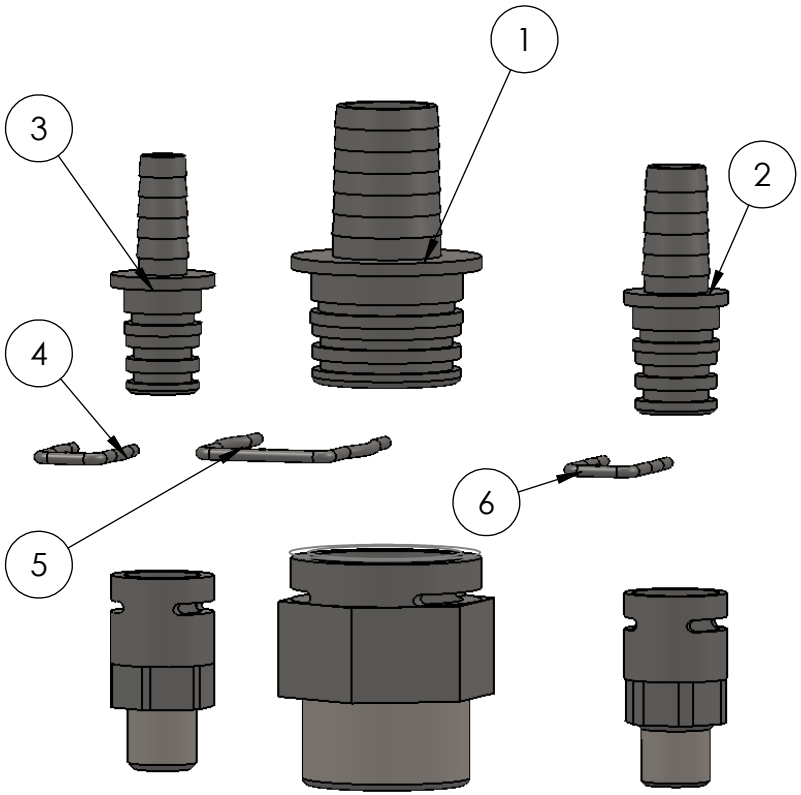

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	200648	Fast-Fitting - 1" Top & Bottom	1
2	200645	Fast-Fitting - 1/2" Top & Bottom	1
3	200642	Fast-Fitting - 3/8" Top & Bottom	1
4	200643	Fast-Fitting Clip - Air In Clip	1
5	200649	Fast-Fitting Clip - Discharge Clip	1
6	200646	Fast-Fitting Clip - Exhaust Clip	1

*Note - Top Barb and bottom NPT part are sold as one unit

*Note - O-Rings are not shown on this illustration

DIMENSIONS ARE IN INCHES
TOLERANCES:
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ONE PLACE DECIMAL : ±0.050
TWO PLACE DECIMAL : ±0.010
THREE PLACE DECIMAL: ±0.005

MATERIAL

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DESIGNED		
CHECKED		
APPROVED		

PUMPONE ENVIRONMENTAL LLC

41H Odell School Road
Concord, NC 28027

TITLE / DESCRIPTION:
Fast Fitting Assembly

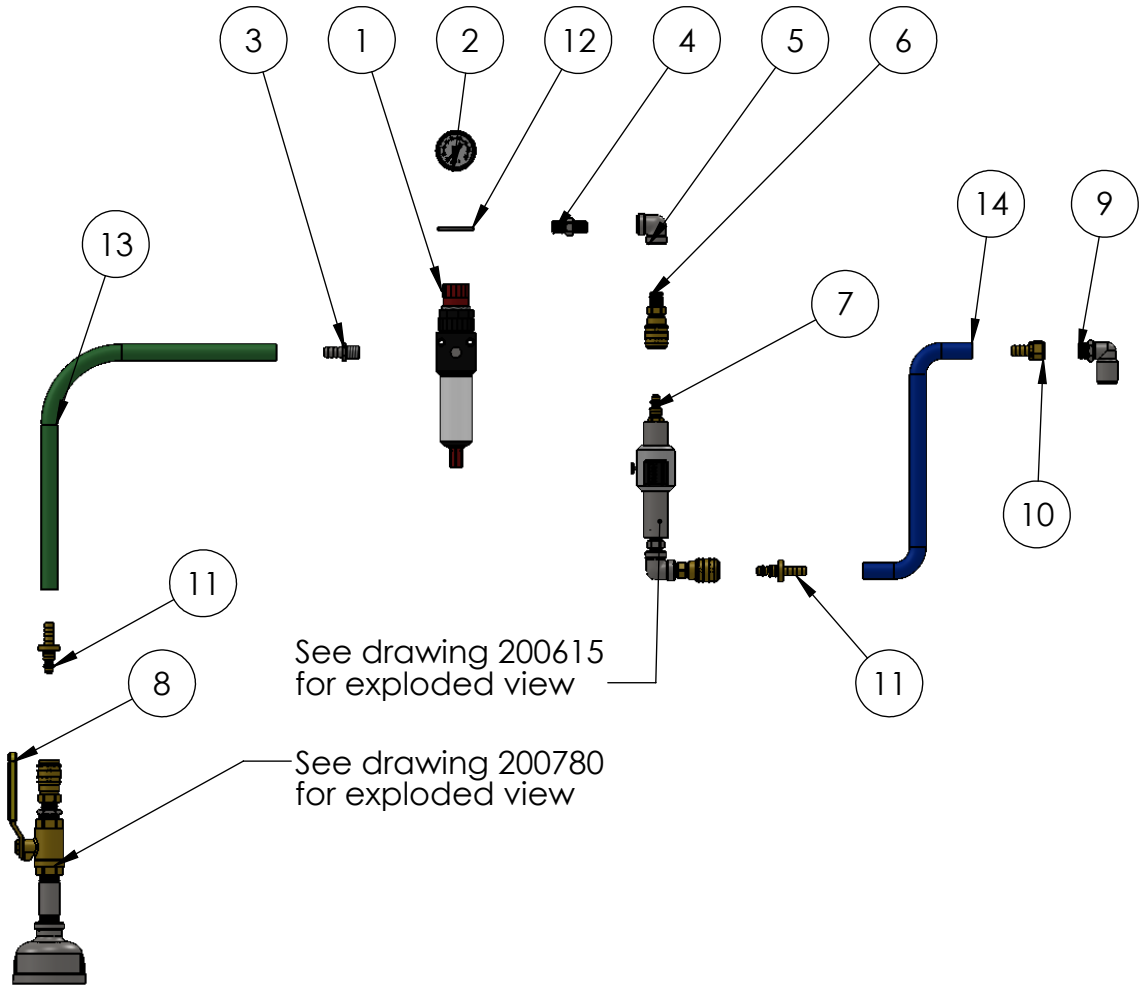
DWG. NO. 200640

REV 1

SCALE: 1:4

SHEET 1 OF 1

5 4 3 2 1



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	70006	1/4" NPT Filter Regulator	1
2	70007	Gauge -METALWORK GAUGE M40 1/8 0-12	1
3	70004	Hose Barb - Brass Male NPT x Barb Fitting	1
4	70008	Nipple - 1/4" NPT Hex Nipple	2
5	70009	Elbow - 1/4" S/S Elbow	2
6	70011	Quick Connect - ISO 6150B Brass Female Coupler X MNPT	2
7	200615	Counter - Mechanical Airpulse Counter with Fittings	1
8	200780	Air Intake Kit - Valve Manifold	1
9	70015	Elbow - Push Fit - 1/2" Push Fit x 3/8" NPT Swivel 90 deg. Elbow	1
10	70014	Brass Female NPT x Barb Fitting	1
11	70001	Quick Connect - ISO 615OB Brass Male Coupler x Barb	2
12	70005	Bracket - Mounting Bracket For Filter Regulator	1
13	70002	Hose - 3/8" X 5' Green Insta-Grip 300	5
14	70013	Hose - 3/8" X 3' Blue Insta Grip 300	3

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ONE PLACE DECIMAL : ±0.050
TWO PLACE DECIMAL : ±0.010
THREE PLACE DECIMAL: ±0.005

MATERIAL

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DESIGNED		
CHECKED		
APPROVED		

PUMPONE ENVIRONMENTAL LLC

41H Odell School Road
Concord, NC 28027

TITLE / DESCRIPTION:
Air Kit - Assembly

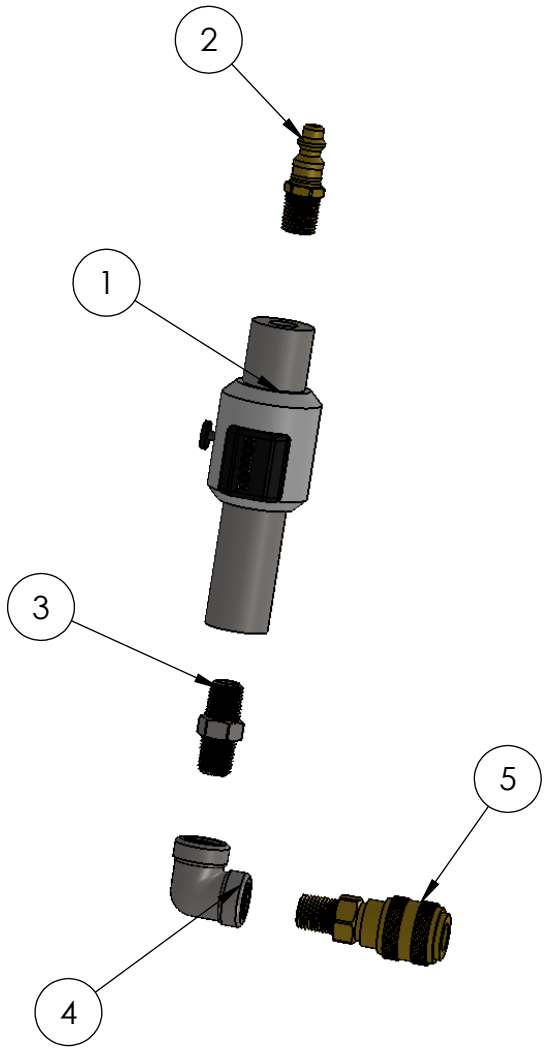
DWG. NO. 70000

REV 1

SCALE: 1:8

SHEET 1 OF 1

5 4 3 2 1



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	200600	Counter - Mechanical Airpulse Counter	1
2	70010	Quick Connect - ISO 6150B Brass Male Coupler X MNPT	1
3	70008	Nipple - 1/4" NPT Hex Nipple	1
4	70009	Elbow - 1/4" S/S Elbow	1
5	70011	Quick Connect - ISO 6150B Brass Female Coupler X MNPT	1

DIMENSIONS ARE IN INCHES
TOLERANCES:
ANGULAR: MACH ± .5°
ONE PLACE DECIMAL : ±0.050
TWO PLACE DECIMAL : ±0.010
THREE PLACE DECIMAL: ±0.005

MATERIAL

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FINISH
UNLESS NOTED OTHERWISE

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DESIGNED		
CHECKED		
APPROVED		

PUMPONE ENVIRONMENTAL LLC

41H Odell School Road
Concord, NC 28027

TITLE / DESCRIPTION:
Counter - Mechanical Airpulse Counter with Fittings

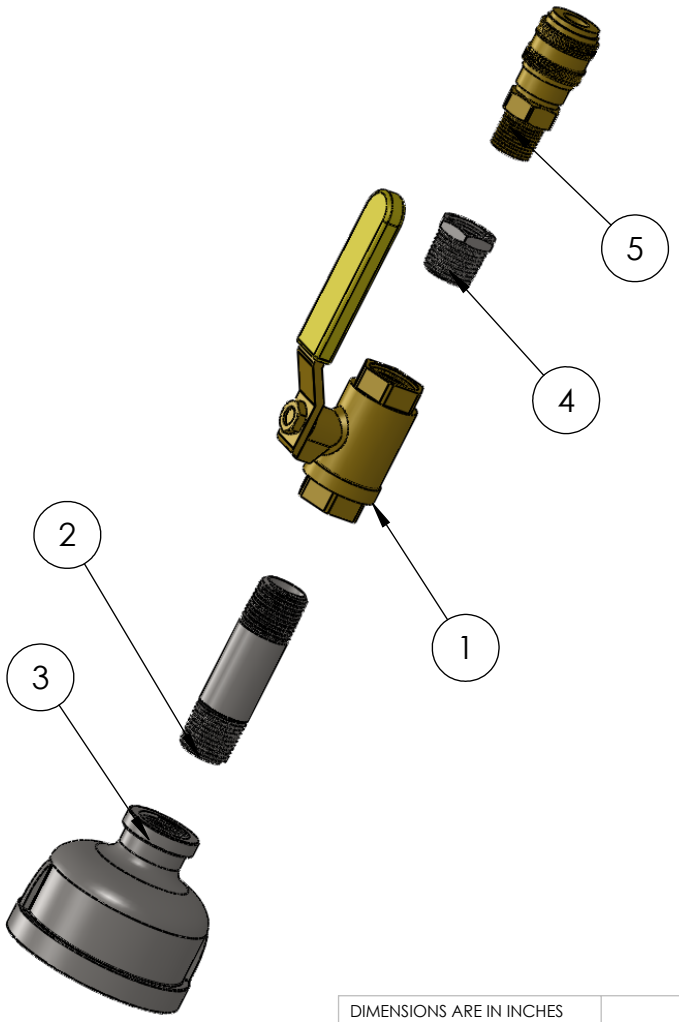
DWG. NO. 200615

REV 1

SCALE: 1:4

SHEET 1 OF 1

5 4 3 2 1



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	70019	Valve - 1/2" Brass Ball Valve Nibco	1
2	70018	Nipple - 1/2" X 3" S/S Nipple	1
3	70017	Bell Reducer - 2" x 1/2" S/S Bell Reducer	1
4	70020	Reducing Bushing - 1/2" X 3/8"	1
5	70001	Quick Connect - ISO 615OB Brass Male Coupler x Barb	1

DIMENSIONS ARE IN INCHES
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ONE PLACE DECIMAL : ±0.050
TWO PLACE DECIMAL : ±0.010
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MATERIAL

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DESIGNED		
CHECKED		
APPROVED		

PUMPONE ENVIRONMENTAL LLC

41H Odell School Road
Concord, NC 28027

TITLE / DESCRIPTION:
Air Intake Kit - Valve Manifold

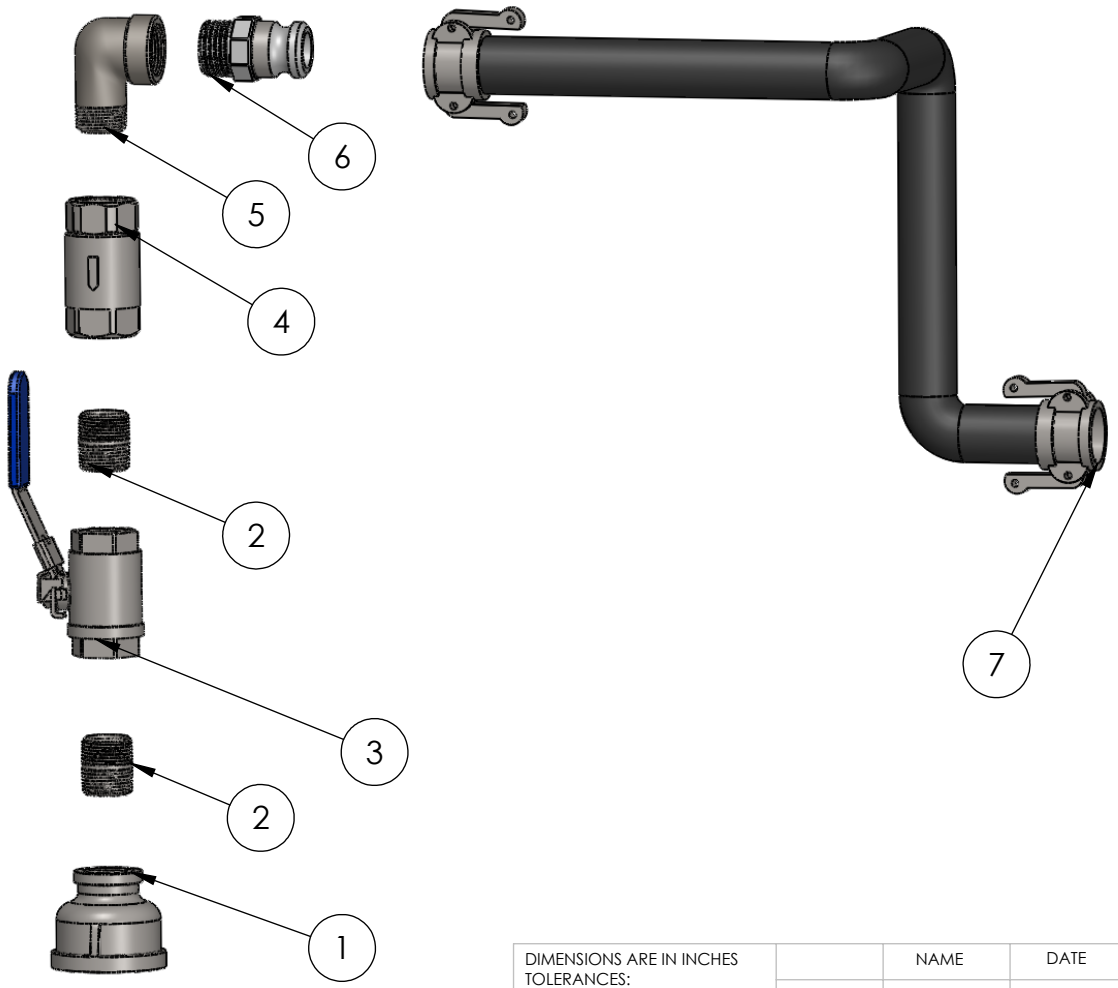
DWG. NO. 200780

REV 1

SCALE: 1:8

SHEET 1 OF 1

5 4 3 2 1



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	90004	2" X 1" Stainless Steel Bell Reducer	1
2	90002	Nipple - 1" x Close Nipple	2
3	90001	Valve - VALPRES S/S 2000 WOG LOCKING BALL VALVE	1
4	90005	Valve - R-B S/S Full Port 8--WOG Check Valve	1
5	90006	Elbow Street - 1" 150# Typ 316 Street Elbow	1
6	90007	Cam-Lock - 1" TYP F Camlock Fitting	1
7	200800	Leachate Discharge Kit - Hose Kit	1

DIMENSIONS ARE IN INCHES
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ONE PLACE DECIMAL : ±0.050
TWO PLACE DECIMAL : ±0.010
THREE PLACE DECIMAL: ±0.005

MATERIAL

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FINISH
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	NAME	DATE
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APPROVED		

PUMPONE ENVIRONMENTAL LLC

41H Odell School Road
Concord, NC 28027

TITLE / DESCRIPTION:
Leachate Discharge Kit - Assembly

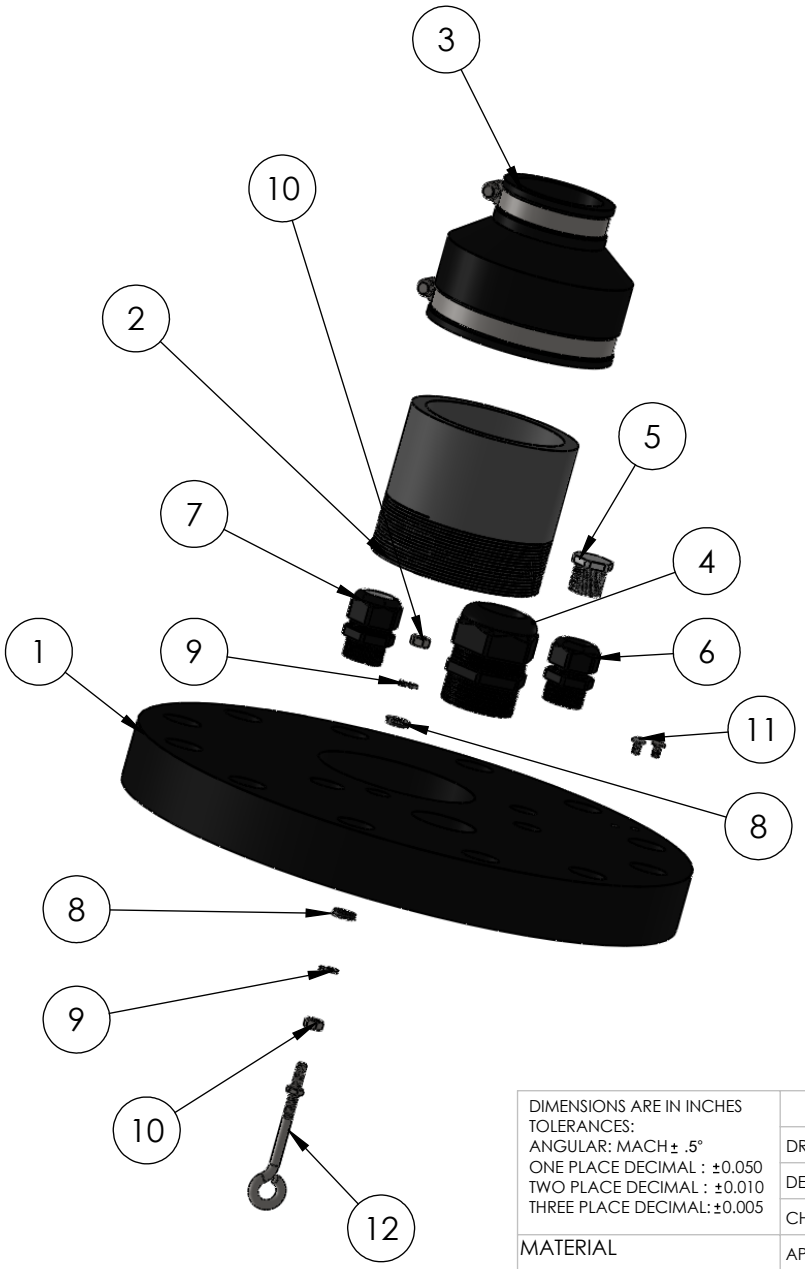
DWG. NO. 90000

REV 1

SCALE: 1:8

SHEET 1 OF 1

5 4 3 2 1



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	85001	Flange - 8" Blind Flange	1
2	80016	Nipple - 4" X 4" PVC Sch. 40	1
3	80015	Fernco - 4" X 2" Fernco Coupling IPS Pipe to Pipe	1
4	80002	Strain / Relief - 1" OD Tubing..Sealing Range - .87" - 1.26" (22 - 32 mm)	1
5	80003.5	Plug - 1/2" PVC Plug	1
6	80008	Strain / Relief - 1/2" OD Tubing	1
7	80007	Strain / Relief - 5/8" OD Tubing	1
8	80010	1/4" Neoprene bonded flat washer 18-8 SS 5/8" OD	2
9	80011	1/4" Medium (split) Lock Washer	2
10	80012	1/4" Hex Nut	2
11	80013	Capscrew - 1/4" - 20 X 3/8" Button Socket Cap Screw	2
12	80009	1/4" - 20 X 4 bent wire eye bolt	1

DIMENSIONS ARE IN INCHES
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ONE PLACE DECIMAL : ±0.050
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DRAWN		
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APPROVED		

PUMPONE ENVIRONMENTAL LLC

41H Odell School Road
Concord, NC 28027

TITLE / DESCRIPTION:
Well Seal - 8"x8" Flanged Well Seal Assembly

DWG. NO. 85000

REV 1

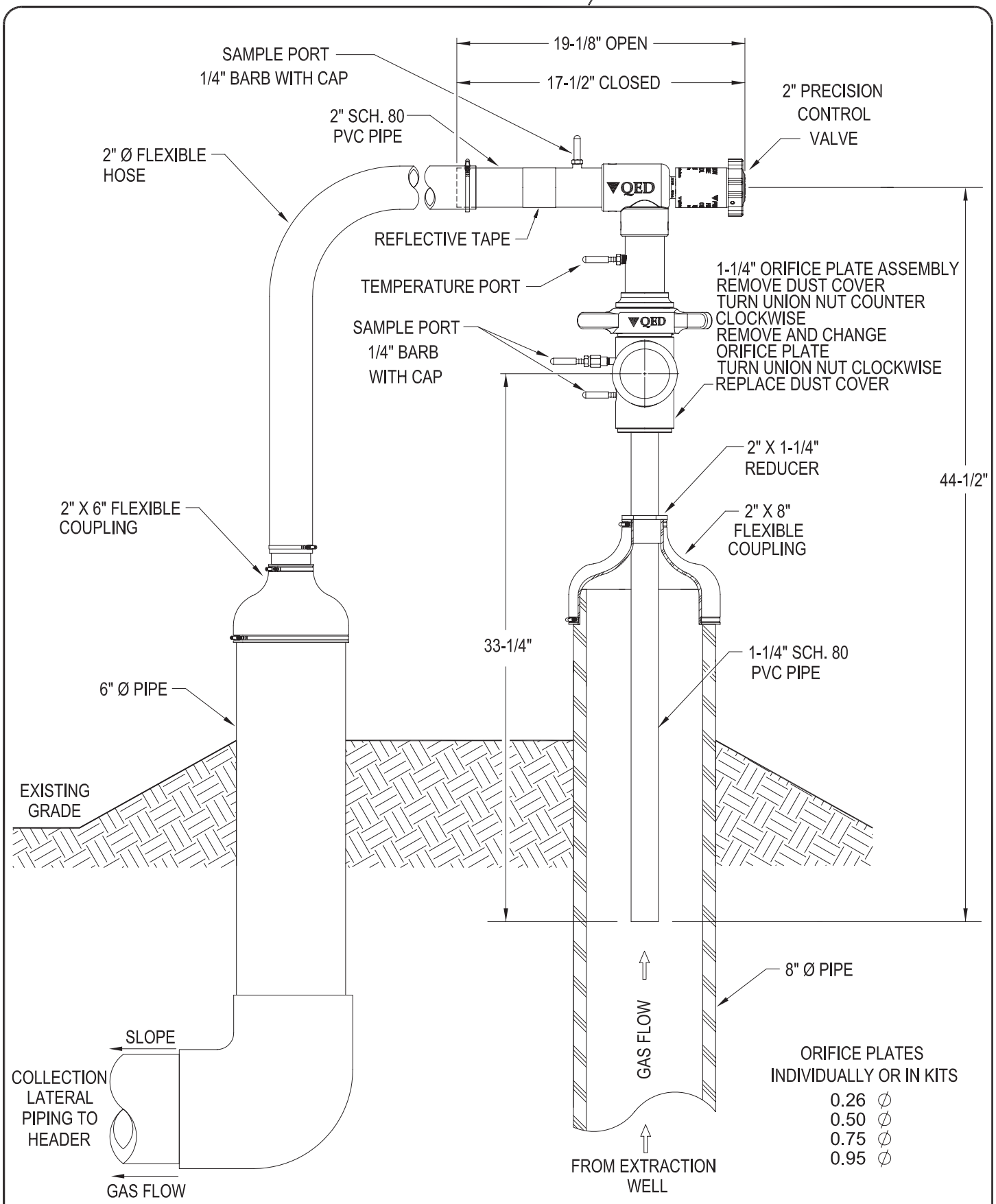
SCALE: 1:12

SHEET 1 OF 1

5 4 3 2 1

APPENDIX H

QUICK CHANGE ORIFICE PLATE WELLHEAD (MODEL ORP115)
FULL ASSEMBLY 1-1/4" X 8"



SCALE 1 = 8

QED Environmental Systems
734-995-2547 -US HEADQUARTERS
734-995-1170 -FAX
800-624-2026 -NORTH AMERICA TOLL FREE
WWW.QEDENV.COM -WEB PAGE

TOLERANCES UNLESS OTHERWISE SPECIFIED ANGULAR : .5° FRAC : .XXX : .005 .XX : .01 .XXXX : .0005	APPROVALS	DATE
MATERIAL	DRAWN TONY RAMIREZ	11-25-13
FINISH	DESIGNER LN/BP	12-02-13
	CHECKED LN/BP	12-02-13
	APPROVED LN/BP	12-02-13

TITLE	QUICK CHANGE ORIFICE PLATE WELLHEAD - ORP115 FULL ASSEMBLY 1-1/4" X 8"	
DWG No.	602537	REV 01
SCALE	1 = 8	SHT 1 OF 1

QED
Environmental Systems

Quick-Change™ Orifice Plate Wellhead

The First Engineered Solutions for LFG Measurement & Control

Quick-Change™ Orifice Plate Wellhead

Revolutionary orifice plate technology for the control and direct measurement of landfill gas.

QED's new Quick-Change (patent pending) Orifice Plate Wellhead combines easy plate exchanges for accurate flow measurements with precise adjustment control over a broad flow range.

The Quick-Change Orifice Plate feature makes it as easy as 1-2-3 for the operator to change to the most appropriate size plate for the given conditions. The accessible plate housing allows for easy confirmation of plate size and placement giving you the highest confidence in your flow reading.

Accessible housing allows easy viewing of installed plate

Changing to the correct orifice plate can be done in seconds, and there is no time wasted shutting down the control valve or rebalancing the wellfield. These benefits all save valuable field time and help reduce labor costs.

The Wellhead's control valve design allows you to finely control gas flow even at rates under 10 scfm. The unique design will change the way operators adjust gas flow. Wells can now be tuned by flow rather than by vacuum.

Quick-Change Orifice Plate Advantages:

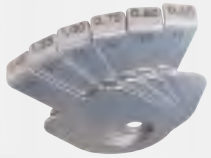
- Saves time – plates can be changed in seconds
- Accurate flow measurements – match the right plate with the gas flow
- Reduces reporting errors – easy to identify the plate size in use

Specifications:

	vertical			horizontal
Model:	**1¼"** (32 mm) **ORP115**	**2"** (50 mm) **ORP215**	**3"** (80 mm) **ORP315**	**2"** (50 mm) **ORP215HV**
Optimal Flow Range:	0-60 scfm (0-102 m³/h)	0-125 scfm (0-212 m³/h)	30-300 scfm (50-500 m³/h)	0-125 scfm (0-212 m³/h)
Wellhead Materials: PVC, Stainless Steel, Viton® Fitting Options: Brass barbs, quick connects				**ORP215HL** 0-125 scfm (0-212 m³/h)

Quick-Change Orifice Plates	1¼" vertical Plate Kit	2" vertical Plate Kit	3" vertical Plate Kit	2" horizontal Plate Kit
	40747	**40640**	**40660**	**40690**
	set of 4 plates:	set of 6 plates:	set of 3 plates:	set of 6 plates:
	0.26" (6.6 mm)	0.40" (10 mm)	1.25" (31 mm)	0.40" (10 mm)
	0.50" (13 mm)	0.50" (13 mm)	1.75" (44 mm)	0.50" (13 mm)
	0.75" (19 mm)	0.75" (19 mm)	2.10" (53 mm)	0.75" (19 mm)
	0.95" (24 mm)	1" (25 mm)		1" (25 mm)
		1.25" (31 mm)		1.25" (31 mm)
		1.40" (35 mm)		1.40" (35 mm)

QED's Quick-Change Orifice Plates are constructed of 1/16" stainless steel. With several sizes of orifice plate available, it is easy to select the right plate for the appropriate pressure drop allowing for accurate flow measurement readings.



STEP 1
Remove dust cover and loosen collar with a quarter-turn

STEP 2
Change plate

STEP 3
Tighten collar and replace dust cover

Precision Fine Tune Control Valve™ Advantages:

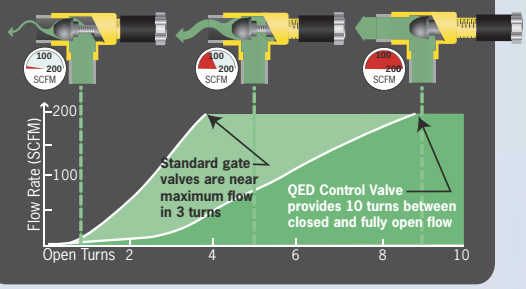
- Fine adjustment over entire range of valve movement
- Position scale shows exact valve setting for easy reset
- Rugged stainless steel stem/handle for long-term durability

Heavy duty stainless steel stem and handle outlasts plastic used in standard gate valves

All Precision Wellheads include the Precision Fine Tune Control Valve (patent pending). This Control Valve is a breakthrough in landfill gas wellfield tuning. Unlike traditional "gate" type valves, this valve allows you to easily and precisely adjust the gas flow from a well, rather than just turning the flow on or off. The revolutionary design gives you the ability to achieve linear flow adjustment across the entire range of valve movement.

The valve also has a high visibility metered scale that allows you to easily observe the flow setting, and quickly and accurately return to the exact setting after a shutdown. The rising stem valve exposes more of the metered scale as it is opened, allowing you to see and record numerically exactly how far the valve is open.

New QED control valve design outperforms common globe and gate valves



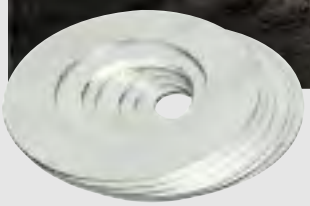
The rugged stainless steel valve stem and handle make the Fine Tune Control Valve much more durable in the harsh outdoor environment to which landfill gas wells are exposed.

Stabilizer™ LFG Well Caps

QED's innovative Stabilizer™ LFG Well Caps (patent pending) feature a unique support ring molded directly into the Cap that aligns and stabilizes the LFG wellhead. This takes pressure off the flexible coupling and the flex hose and, along with watertight threads, reduces leaks from the wellhead. The caps are molded in a bright yellow, which helps identify and protect the entire well from damage.

QED Union Orifice Plate Wellhead

All QED Wellheads come with the Fine Tune Control Valve.



Set of interchangeable orifice plates

QED's new Traditional Orifice Plate Wellhead is available for both 2" and 3" pipes. The wellhead is constructed of sturdy, economical Schedule 80 PVC and QED's Orifice Plates are constructed of 1/16" stainless steel. Using the most appropriate orifice plate size with minimal pressure drop is essential to generate stable flow readings with the best resolution. Using the right size plate means you will always have confidence in your flow reading and you will be sure to meet your compliance regulations.

A wellhead for those looking for sensitive flow adjustment capability and a lower cost assembly.

Specifications:	**2"** (50 mm)	**3"** (76 mm)
Model:	**OPU200**	**OPU300**
Optimal Flow Range:	0-125 scfm (0-212 m³/h)	30-300 scfm (50-500 m³/h)

Materials: 304 Stainless Steel, PVC, Viton®

40572 2" Orifice Plate Kit	includes all 6 orifice plates for OPU200
40600 3" Orifice Plate Kit	includes 3 orifice plates for OPU300

Flow Meter™ Wellhead

The Flow Meter Wellhead is designed to insure the proper placement of the Precision Flow Meter's Insertion Probe into the gas stream. Lock pin system insures the proper orientation of the probe every time.

The Precision Flow Meter is an extremely accurate portable thermal mass flow meter. The insertion-style Flow Meter reads directly in scfm, not a calculated value. It can measure and log gas flows through existing ports in headers 1" and larger. And, it has a patented self-calibration check.

A wellhead for those looking for cutting-edge flow measurement technology and precise flow control.

Specifications:	**2"** (50 mm)	**3"** (76 mm)
Model:	**FMW200**	**FMW300**
Optimal Flow Range:	0-125 scfm (0-212 m³/h)	30-300 scfm (50-500 m³/h)

Materials: 304 Stainless Steel, PVC, Viton®

(Visit www.qedenv.com/landfillproducts for more for details.)

Products for Environmental Cleanup

Remediation, Landfills and Groundwater Sampling

QED Environmental Systems

P.O. Box 3726
Ann Arbor, MI 48106-3726
USA

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T: 734-995-2547
F: 734-995-1170
info@qedenv.com
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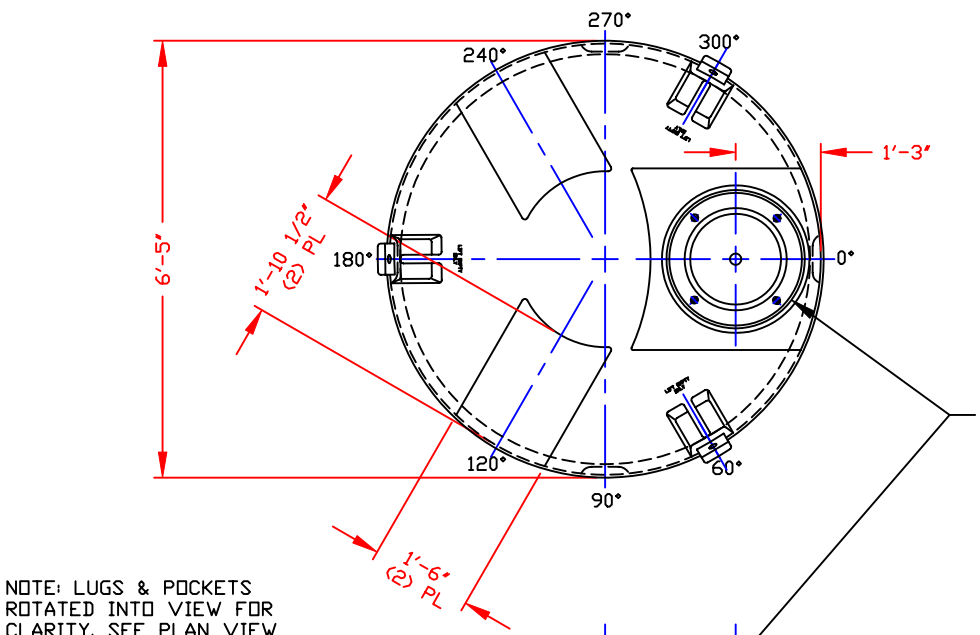
CODE 2355
rev 12/13

APPENDIX I

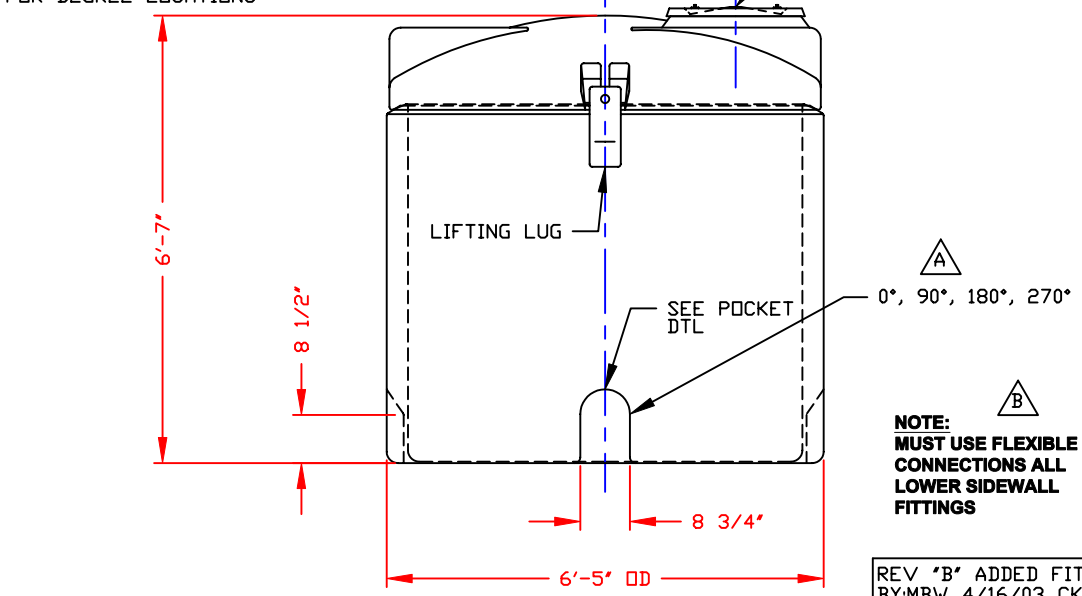
01010 Newberry soil gas extraction project 2014-31

NON-CONTROLLED COPY INFORMATION SUBJECT TO CHANGE WITHOUT NOTICE COPY WILL NOT BE UPDATED	COPY ISSUED BY_____. COPY ISSUED ON_____.

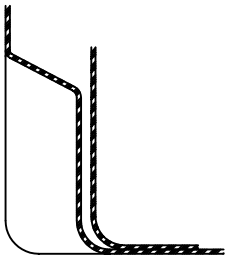


STANDARD COVER:
19"/(4) BOLT MANWAY COVER/PE (SHOWN)
STOCK NO. 3213 OR
19"/STRAPPED MANWAY COVER/PE
STOCK NO. 3212

NOTE: LUGS & POCKETS ROTATED INTO VIEW FOR CLARITY. SEE PLAN VIEW FOR DEGREE LOCATIONS



NOTE:
MUST USE FLEXIBLE CONNECTIONS ALL LOWER SIDEWALL FITTINGS



POCKET DETAIL
SCALE: NONE

NOTES:
1. THIS IS A COMPUTER GENERATED DWG. DO NOT REVISE BY HAND.
2. DIMENSIONS WILL VARY ±3% DUE TO VARIATIONS IN MULTIPLE MOLDS & CONDITIONS PREVALENT DURING MANUFACTURE & USAGE.
3. FOR INNER TANK DTLS SEE COMPUTER FILE NO. 12001000. TITLE "1000 GALLON INNER SAFE-TANK." FOR OUTER TANK DTLS SEE COMPUTER FILE NO. 12101200, TITLE "1000 GALLON OUTER SAFE-TANK/ 1200 GALLON OPEN TOP TANK."

CALCULATED CAPACITIES/ VOLUME IN U.S. GALLONS			
TANK	DESIGN CAP	DOME VOL	TOTAL VOL
INNER	1016	187	1203
OUTER	1215	N/A	1215

REV "B" ADDED FITTING NOTE
BY:MBW 4/16/03 CK:JB

REV "A" ADDED NOTE & POCKETS IN IN PLAN VIEW BY:JB 1/28/02 CK:WM

DWG TITLE: 1000 GALLON SAFE-TANK ASSEMBLY

SCALE: 1/2"=1'-0"
DATE: 6/28/00

POLY PROCESSING Company
Western Region
P.O. Box 69
8055 South Ash Street
French Camp, CA 95231
(209) 982-1904
FAX (209) 982-8455

DR: MB WILKERSON
CK: J. BRANTLEY

SHEET: 1 OF 1
COMPUTER FILE: 12001000A
REV: B

B-5

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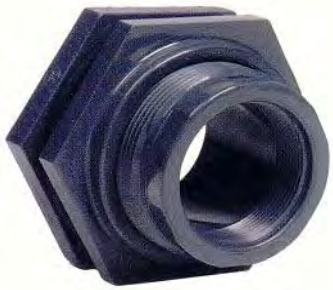
1-866-590-6845

FITTING AND ACCESSORY REFERENCE CHART

Flexible Connection
(HOSE W/MNPT UHMWPE)

Expansion Joints
(FLX JNT w/ optional FLG)



Bulkhead Fitting
(BHF)

Flange Adapter
(FLG ADPT)

Siphon Leg or Dip Tube

Bolted Flanged Bulkhead Fitting
(BLTD FLG BHF)

SS Bulkhead Fitting Coupling
(SS BHF ASMLY CPL)

SS Bulkhead Fitting Full Nipple
(SS BHF ASMLY FL NPL)

SS Bulkhead Fitting - Half Nipple
(SS BHF HALF NIPPLE)

Bolted Flange Fitting
(BLTD FLG FTG)

Bolted Spool Fitting with Gussets
(BLTD SPOOL FTG)

Self Aligning Universal Ball Dome - BHF Style
(UBD FTG BHF STYLE)

Self Aligning Universal Ball Dome - Flange Style
(UBD FTG FLG STYLE)

FITTING AND ACCESSORY REFERENCE CHART

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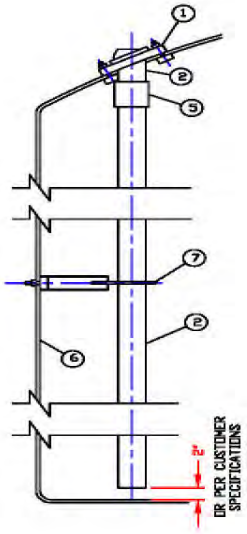
Thru-The-Dome Vertical Fitting with Optional Flange Adapter
(DOME FTG TTD STYLE)

Fill Line Assembly with Optional Ball Valve, Quick Adapter & Cap



Internal Drop Pipe

Pipe Support

Bolted Manway Cover
(CVR ASMBLY)

Combination Manway Cover
(CVR ASMBLY COM)

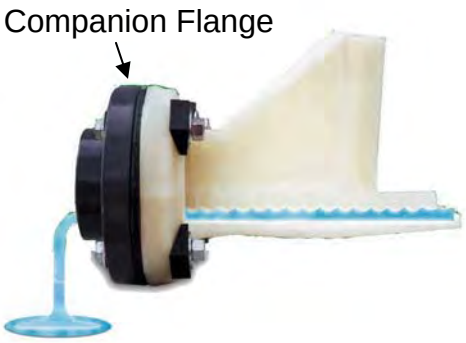
SAFE-Surge™ Emergency Pressure Relief Cover

Mushroom Vent

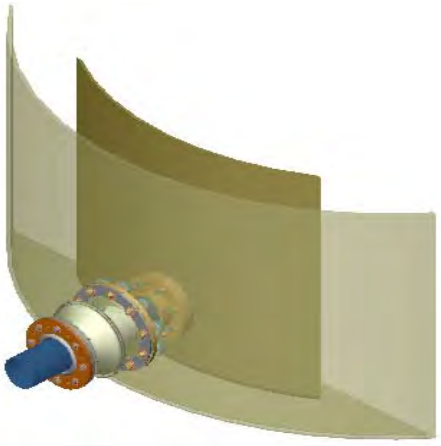
U-Vent

PVC Liquid Level Gauges
(LEVEL GAGE STD TYPE)

Reverse Float Level Gauges
(LEVEL GAGE FLT TYPE)



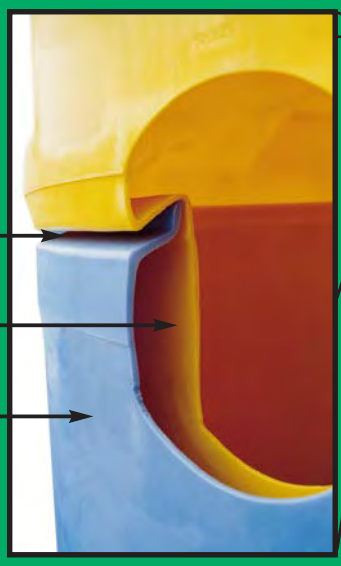
IMFO®
Integrally Molded Flanged Outlet

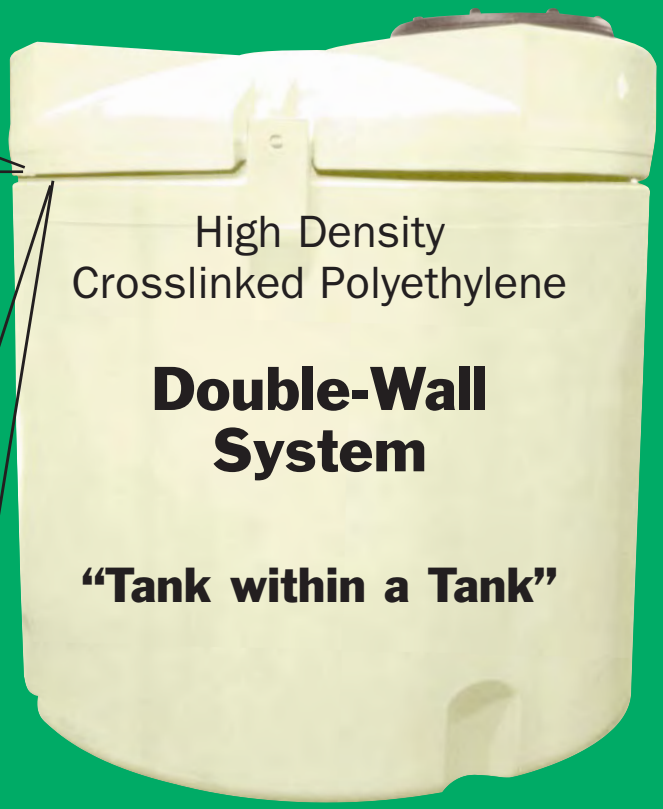


SAFE-Tank® Transition Fitting
(TRNS FTG BELLOW STYLE)

Environment Friendly

SAFE-TANK®





High Density
Crosslinked Polyethylene

Double-Wall System

"Tank within a Tank"

- Peace of Mind
- Environmental Care
- Protected Containment Area
- Smaller Footprint
- HDXLPE Construction

SAFE-TANK® Storage & Containment Solution

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APPENDIX J

Device ID	Date/Time	CH4	CO2	O2	Balance	Init. Static Press.	Adj. Static Press.	Init. Diff. Press.	Adj. Diff. Press.	Init. Gas Temp.	Adj. Gas Temp.	Baro. Press.	Sys. Press.
		%	%	%	%	inches H2O	inches H2O	inches H2O	inches H2O	DegF	DegF	inches Hg	inches H2O
NCLFEW01	5/12/2015 10:21	42.5	37.2	1.6	18.7	-55.8	-4.3	0.893	-0.219	70	70	29.54	-60.14
NCLFEW02	5/12/2015 10:30	29.4	29.4	2.9	38.3	-52.1	-3.3	5.678	-0.186	75	75	29.53	-68.21
NCLFEW03	5/12/2015 10:39	18.5	2.1	14.4	65	-67.4	-67.6	-0.148	-0.131	88	85	29.53	-67.59
NCLFEW04	5/12/2015 10:49	46.8	33.5	1	18.7	-65.7	-14.2	0.924	-0.109	70	70	29.55	-70.63
NCLFEW05	5/12/2015 11:00	36	31.2	0.7	32.1	-64	-39.7	5.072	1.46	72	70	29.55	-74.95
NCLFEW06	5/12/2015 11:07	18.8	18.9	2.9	59.4	-70.2	-41.7	1.887	0.674	70	70	29.56	-75.83
NCLFEW07	5/12/2015 11:11	39.5	34.3	0.3	25.9	-68	-31.2	5.823	1.231	60	60	29.57	-80.8
NCLFEW08	5/12/2015 11:19	42.4	39.2	0.3	18.1	-62.9	-25.3	13.045	1.678	64	64	29.57	-92.93
NCLFEW09	5/12/2015 11:48	42.5	37.1	1	19.4	-38.2	-23.8	1.496	0.548	66	66	29.59	-41.34
NCLFEW10	5/12/2015 11:54	37.5	38.8	0	23.7	-34.3	-21.7	5.131	2.124	66	66	29.59	-43.04
NCLFEW11	5/12/2015 12:00	31.8	36.5	0	31.7	-24.6	-21.1	4.617	3.704	64	64	29.59	-46.59
NCLFEW12	5/12/2015 12:07	50	37.3	0	12.7	-44.8	-16.8	1.472	0.178	65	65	29.58	-48.85
NCLFEW13	5/12/2015 12:13	50.3	40.6	0	9.1	-47	-25.4	0.797	0.194	66	66	29.59	-49.9
NCLFEW14	5/12/2015 12:18	45	40.6	0	14.4	-48.9	-37	0.353	0.318	65	65	29.59	-50.61
NCLFEW16	5/12/2015 12:24	58.8	40.2	0	1	-47.6	-26.1	1.825	0.56	60	60	29.59	-52.28
NCLFEW17	5/12/2015 12:30	47.9	33.3	3.1	15.7	-52	-46.5	0.072	-0.048	84	84	29.59	-51.97
NCLFEW18	5/12/2015 13:26	61.9	35	0	3.1	-32.2	-31	0.119	0.161	94	94	29.6	-32.09
NCLFEW19	5/12/2015 13:29	53.4	31.7	0	14.9	-31.7	-26.9	0.523	0.369	72	72	29.59	-32.41
NCLFEW20	5/12/2015 13:32	50	32.4	0.4	17.2	-29.5	-19.7	2.685	0.891	68	68	29.59	-34.1
NCLFEW21	5/12/2015 13:37	19.5	28.1	0.5	51.9	-33.9	-26.8	0.601	0.389	74	74	29.58	-34.85
NCLFEW22	5/12/2015 13:42	45.5	39.3	0	15.2	-34.4	-30.1	0.398	0.318	74	74	29.58	-34.68
NCLFEW23	5/12/2015 13:46	39	37.9	0	23.1	-34.2	-22	0.794	0.448	70	70	29.57	-35.63
NCLFEW24	5/12/2015 13:49	37.2	37.6	0	25.2	-33.6	-21.9	1.968	0.73	70	70	29.57	-36.64
NCLFEW25	5/12/2015 13:58	26.9	23.4	2.1	47.6	-37	-36.6	0.134	0.159	95	95	29.56	-36.74
NCLFH00A	5/12/2015 14:19	35.3	29.8	0.5	34.4	-37.8	-37.8	>>>>	>>>>	0	0	29.53	N/A
NCLFH00B	5/12/2015 14:21	39.6	35.7	0.2	24.5	-37.8	-37.8	>>>>	>>>>	0	0	29.53	N/A
NCLFH00C	5/12/2015 14:22	40.8	34.5	0.2	24.5	-37.8	-37.8	>>>>	>>>>	0	0	29.53	N/A