

Appendix B
Vendor and Engineering Submittals

Table of Contents

Air Stripper Assembly (Tab 1)

Air Stripper Drawing (1 page)

Air Stripper Manufacturer's Certification (7 pages)

Blower Skid Drawing (1 page)

Air Stripper Maintenance Pump (1 page)

Air Stripper Operations and Maintenance (Tab 2)

EZ-Tray Operations Manual (62 pages)

Electrical and Instrumentation Assembly (Tab 3)

Electrical Components (13 pages)

Liquid Level Probes (Tab 4)

Liquid Level Probes (3 pages)

Steel Platform Assembly (Tab 5)

Steel Platform Construction drawings (8 pages)

Seaguard Marine Epoxy Material Safety Data Sheet (4 pages)

Seaguard 6000 Product Information (4 pages)

Platform Calculations (22 pages)

Handrail and Ladder (1 page)

Vapor Phase Treatment (Tab 6)

Vapor Treatment Vessel (2 pages)

KMnO₄ Material Safety Data Sheet (3 pages)

Weighted Relief Valve (1 page)

KMnO₄ Seismic Calculations (12 pages)

Vapor Phase Assembly (Tab 7)

Air Filter and Housing (2 pages)

Blower Silencer (3 pages)

Offset Pipe Clamp (1 page)

Stainless Steel Fastener (2 pages)

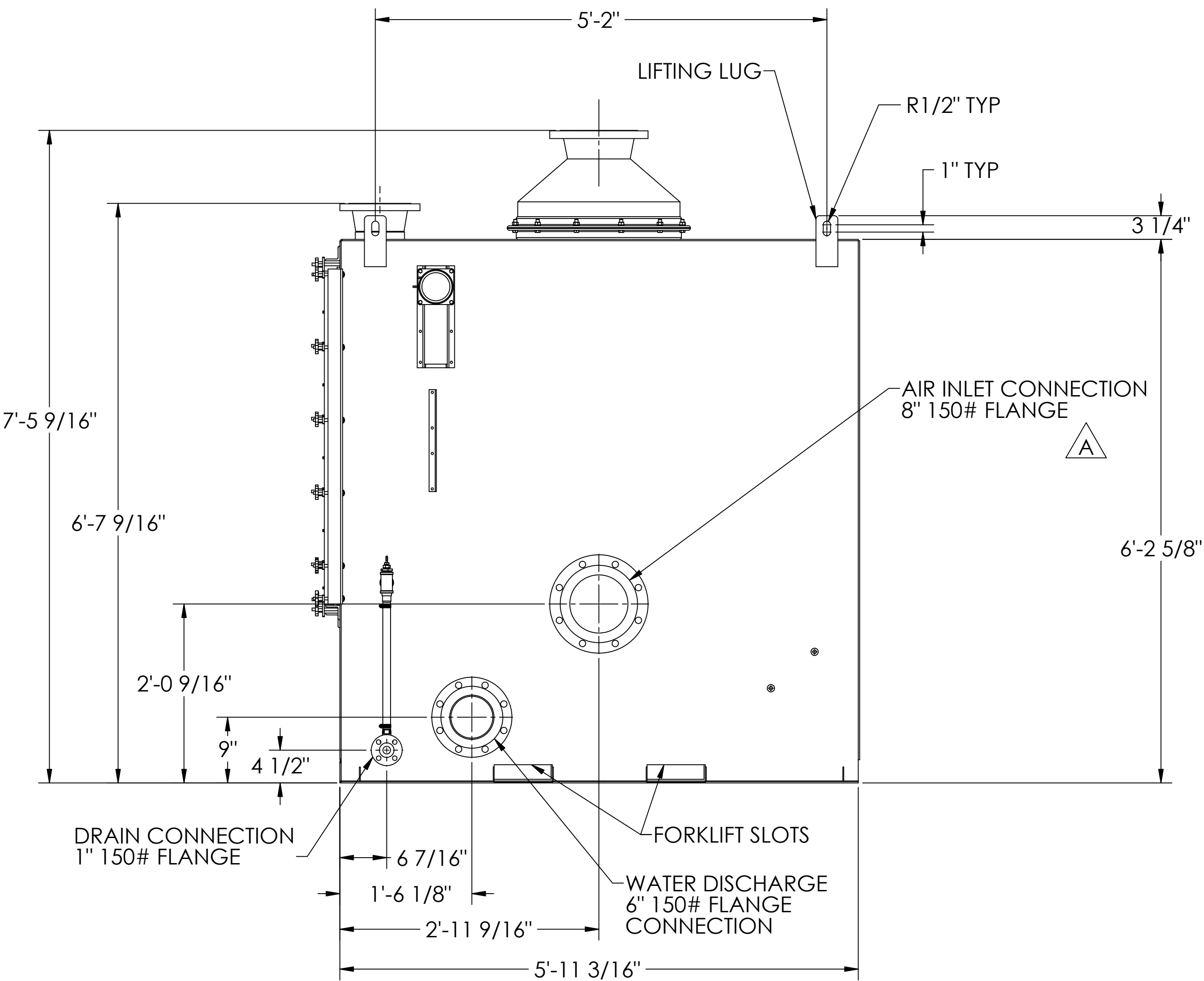
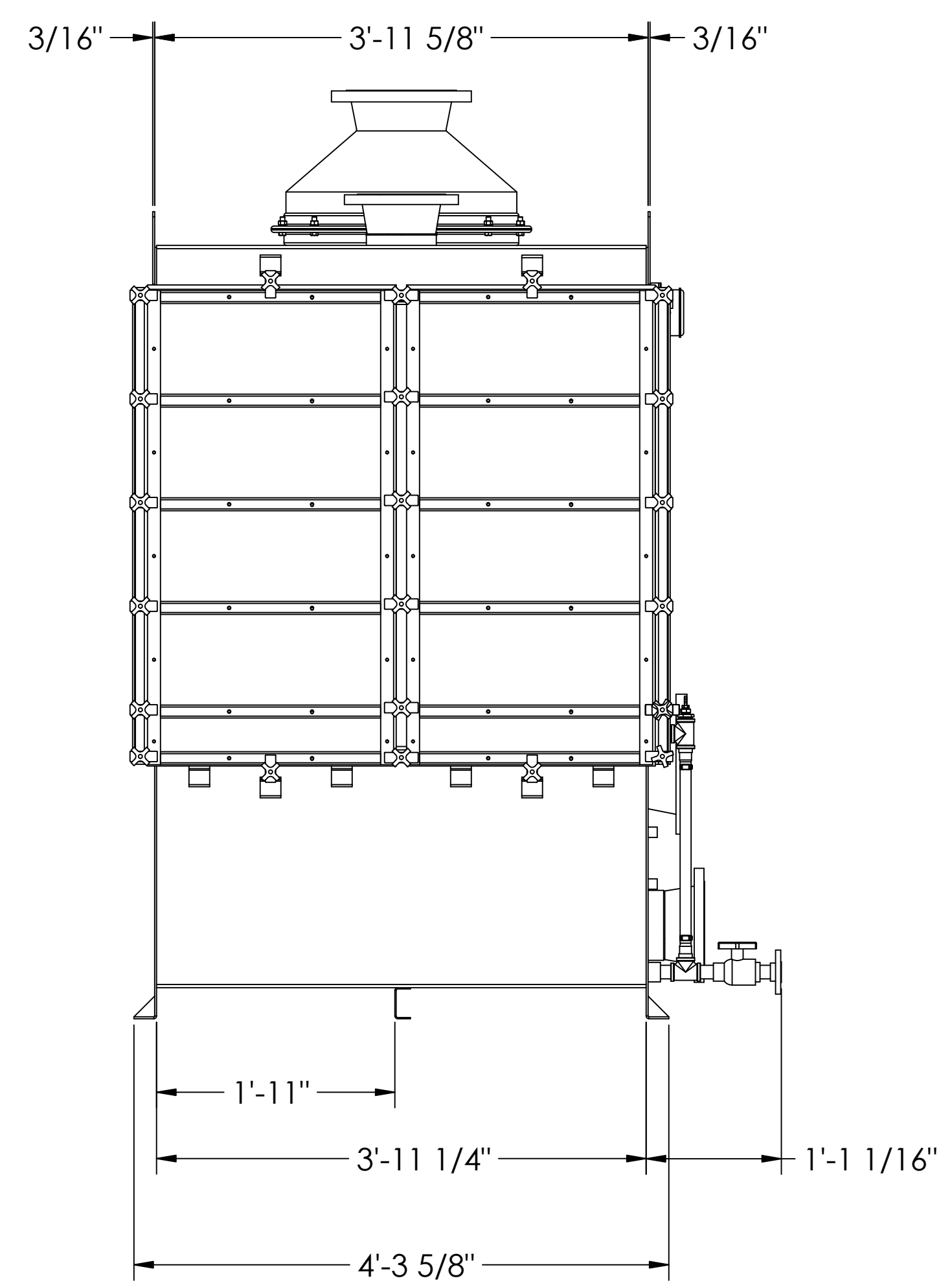
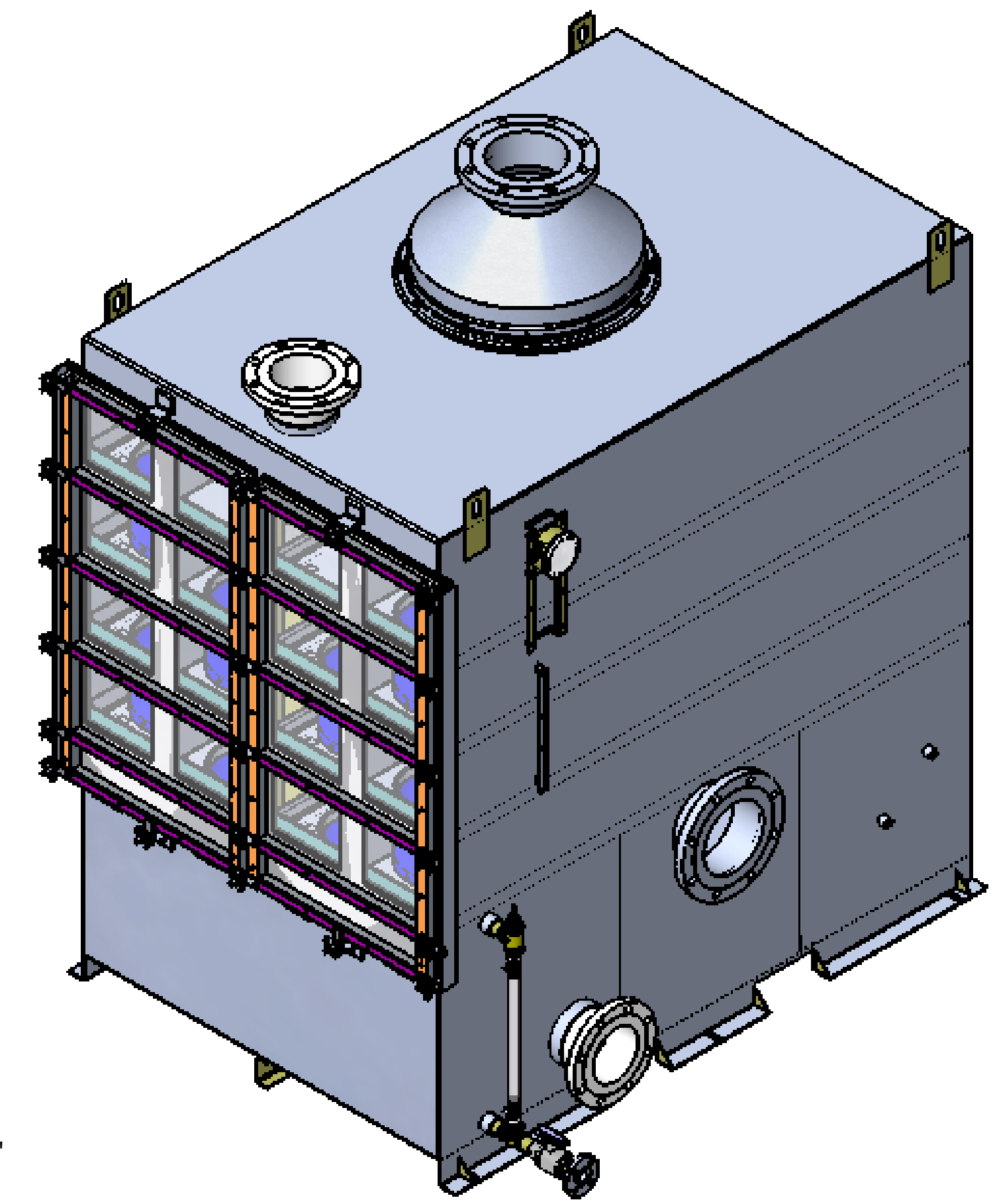
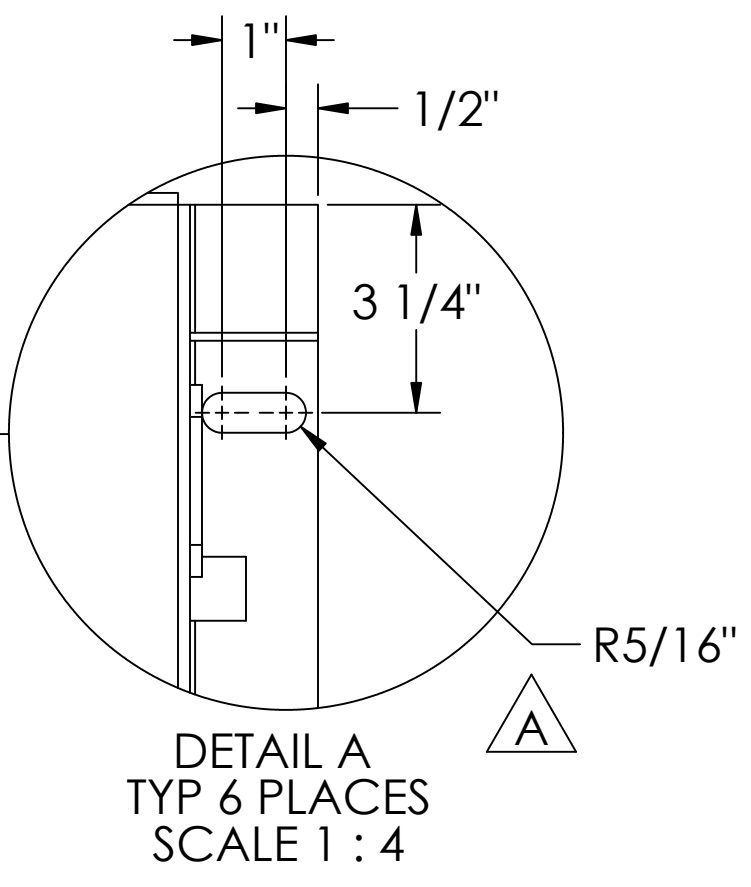
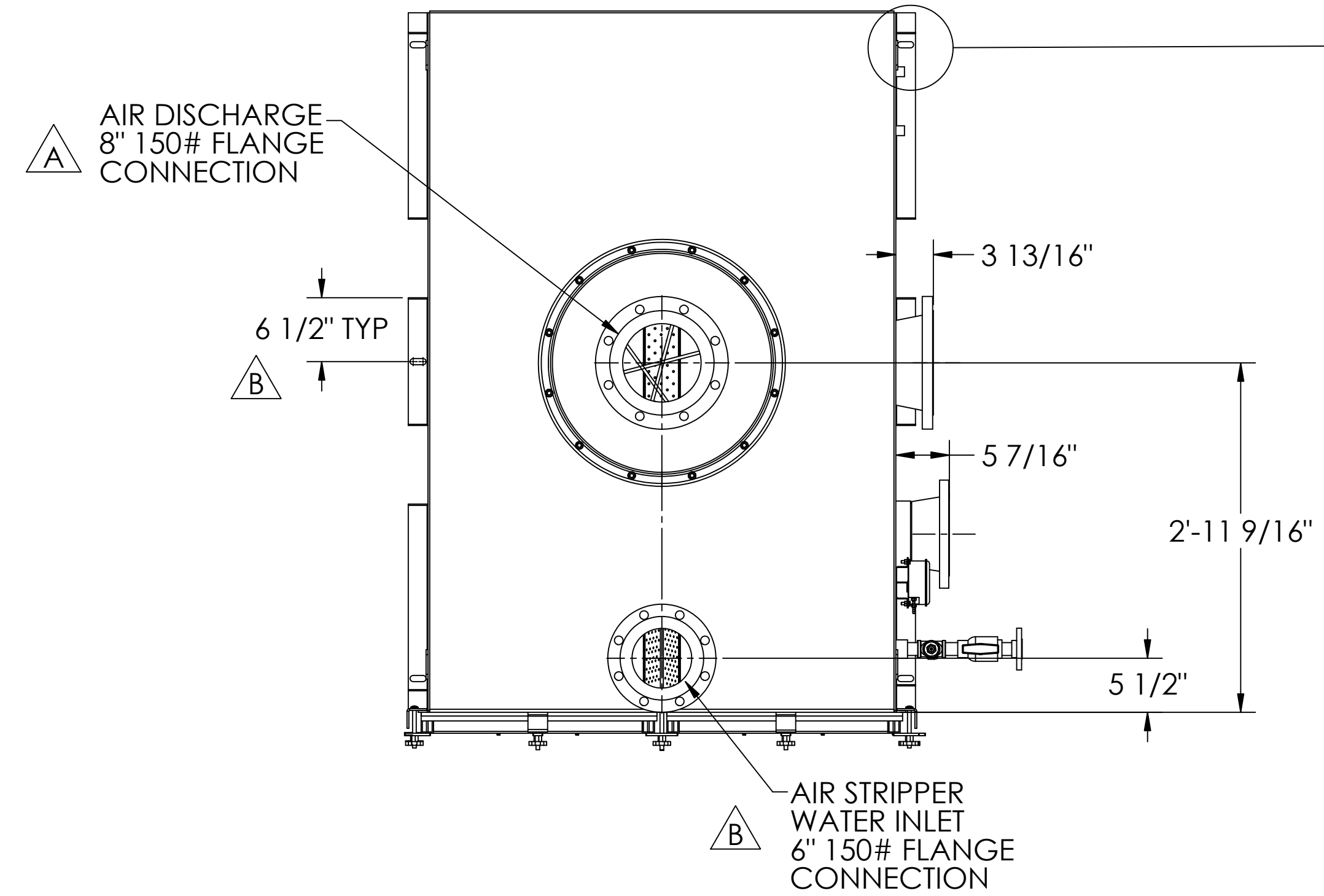
Round Pipe Flashing (1 page)

Air Stripper Assembly




THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF Q.E.D ENVIRONMENTAL SYSTEMS INC. ANY REPRODUCTION IN PART OR WHOLE WITHOUT THE WRITTEN PERMISSION OF Q.E.D. ENVIRONMENTAL SYSTEM INC. IS PROHIBITED.

REVISIONS				
REV.	DESCRIPTION	REVISION BY	APPROVED	DATE
A	ADDED AIR INLET FLANGE AND AIR DISCHARGE FLANGE, ADDED NOTE, ADDED DETAIL "A"	BS	CB	9/14/05
B	ADDED 6" FLANGE TO WATER INLET, ADDED 2 EXTRA MOUNTING HOLES	BS	CB	9/15/2005
C	REVISED TITLE BLOCK WORDING	BS	CB	9/21/2005



NOTE:
 A 1. APPROXIMATE WIGHT 2,500 LBS

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES AND INCLUDE PLATING. REMOVE ALL BURRS	DRAWN BY	DATE	 6155 JACKSON ROAD, ANN ARBOR, MI. 48103 1133 SEVENTH ST. OAKLAND, CA 94607
	CHECKED BY	DATE	
	APPROVED BY	DATE	
TOLERANCES	XX +/- .13 FRACT +/- 1/4 XXX +/- .005 ANGLES +/- 1/2 OTHER TOLERANCES AS SPECIFIED		TITLE
MATERIAL	2205 SS		DWG. NO. 05T-29881 AS
USED ON	DO NOT SCALE DRAWING		SCALE 1:12



Manufacturer Documentation

Order: 05T-30031A

PO: 119765 OP

The following statement is intended to serve as the manufacturer documentation required for PO #119765 OP.

The items provided by QED Environmental Systems, Inc. meet the requirements of the SOW as well as the specifications and drawings submitted by QED and approved by Shaw Environmental. The air stripper has been fully tested and no leaks are present. Furthermore, each blower was energized for 30 minutes and found operational.

The air stripper unit and blower skid are shipping on 12/30/05 and are expected to be delivered on 1/6/06. An 8000-lb forklift with 6' forks is recommended for offloading the equipment.

Attached are photos of the unit along with the production checklist. Please let me know if any additional information is needed.

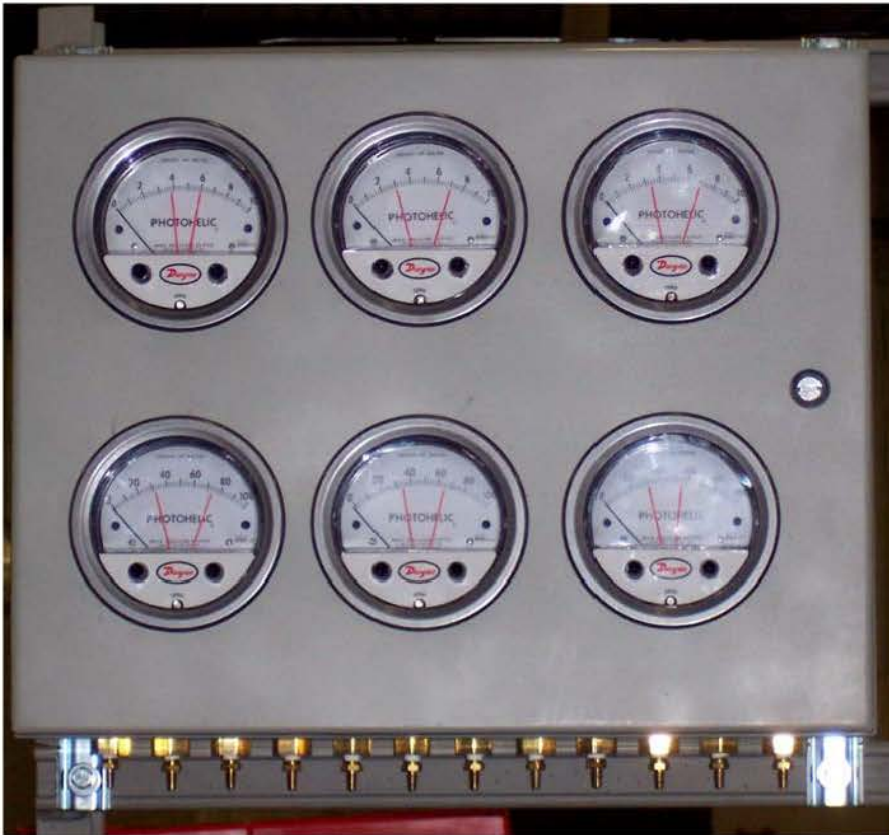
Christy Beears
Treatment/Custom Products Supervisor
Severn Trent - QED Environmental Systems, Inc.

Phone: 800-624-2026 ext 496
email: cbeears@qedenv.com
website: www.qedenv.com









EZ-TRAY and EZ-STACKER STRIPPER FINAL CHECKLIST

PERFORMANCE CHECKS

SYSTEM WET TESTED ACCORDING TO TEST PROCEDURE:

No leaks on system (internal and external on stripper; pumps and piping)

All switches tested and adjusted if necessary:

pump operate

high level

low air pressure (tubing connected to high port)

high air pressure (tubing connected to high port)

bag filter high pressure

All gauges operate

Flow meter accurate (compared to digital test meter)

BLOWER SETTINGS DETERMINED FOR CLEAN AND FOULED TRAYS

At _____ GPM: Clean sump pressure = _____ inches of water column

Fouled sump pressure = _____ inches of water column

BLOWER TEST PERFORMED

RAN EACH Blower for 1/2 HR a piece

EZ-TRAY and EZ-STACKER STRIPPER FINAL CHECKLIST, cont.

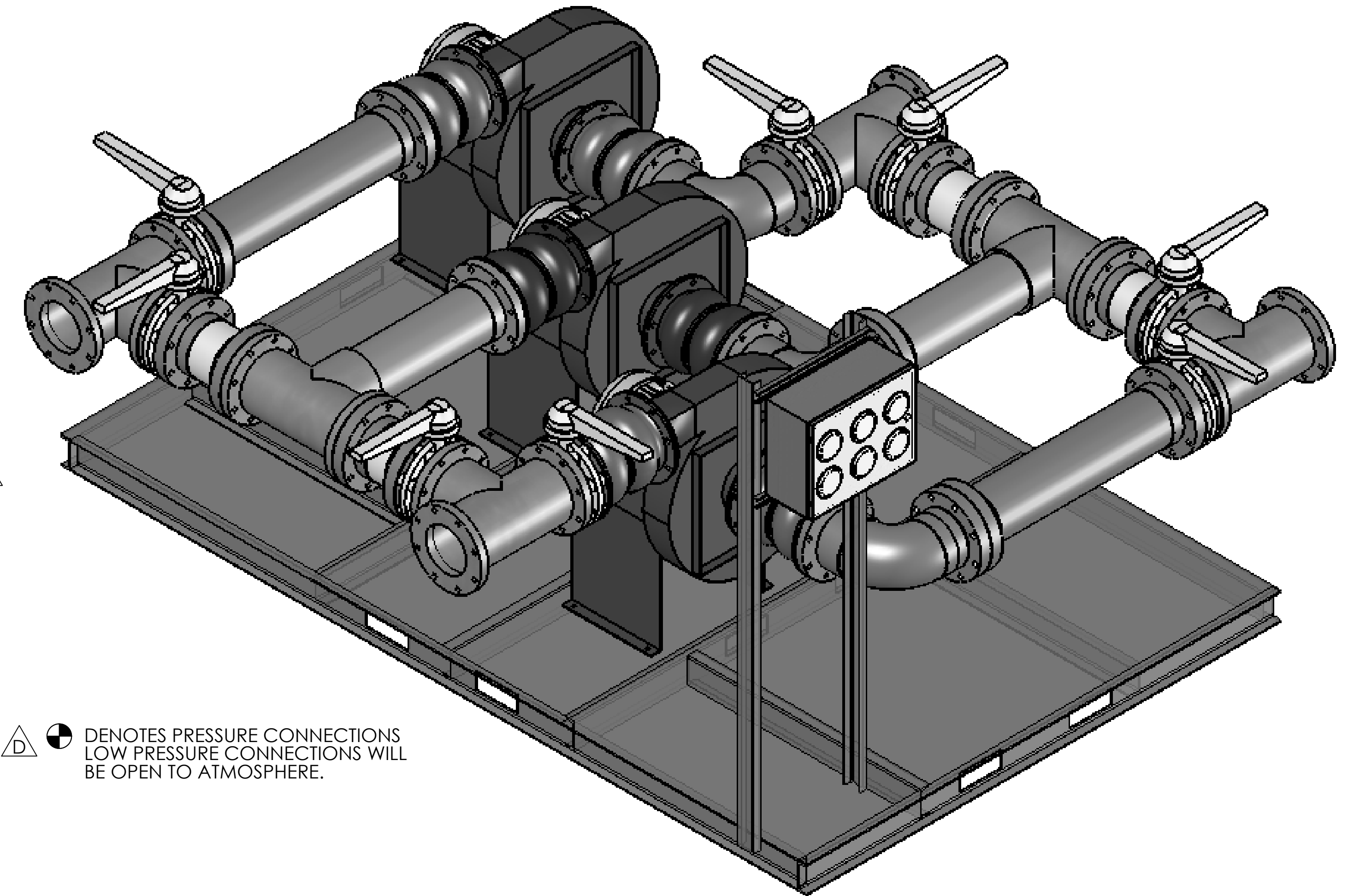
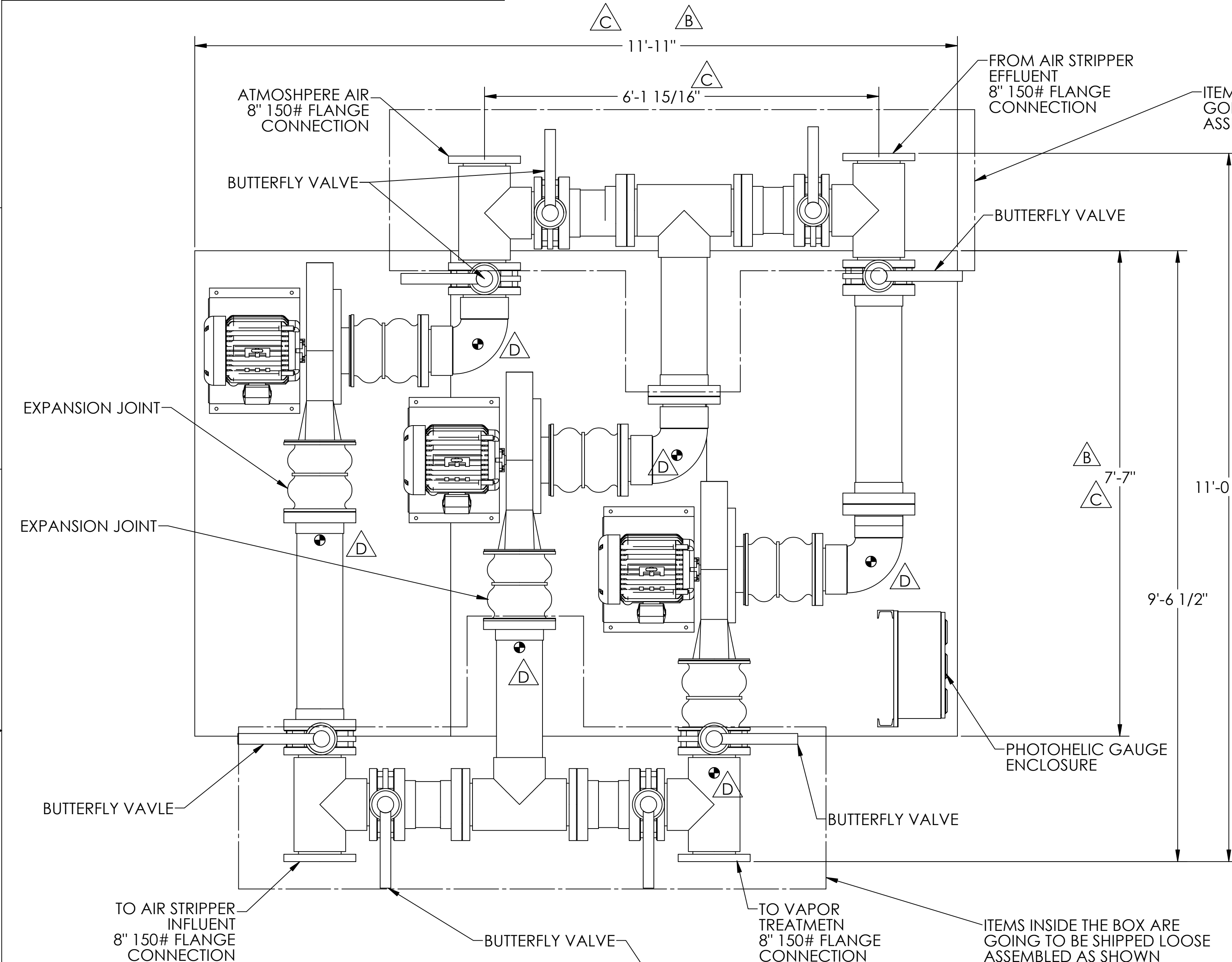
- ALL WATER DRAINED FROM SYSTEM (WATER VACUUMED OUT OF SUMP)
- DEMISTER IN STACK WITH TIE-DOWNS ON TOP AND BOTTOM (EZTS)
- HOLD DOWN SPRINGS ON TIE DOWN RODS SET TO 3.5" (EZSS)
- BLOWER INLET ELBOW SECURELY INSTALLED (NEW YORK BLOWER)
- SYSTEM CLEANED
- SYSTEM LABELED
 - ALL TRAYS, SWITCHES, GAUGES
 - DAMPER SETTING FOR BLOWER (NEW YORK) LABELED NEXT TO THE SUMP PRESSURE GAUGE
 - PATENT LABEL ON STRIPPER
 - UL STICKER ON INSIDE OF CONTROL PANEL DOOR IN LOWER LEFTHAND CORNER

DOCUMENTATION CHECK

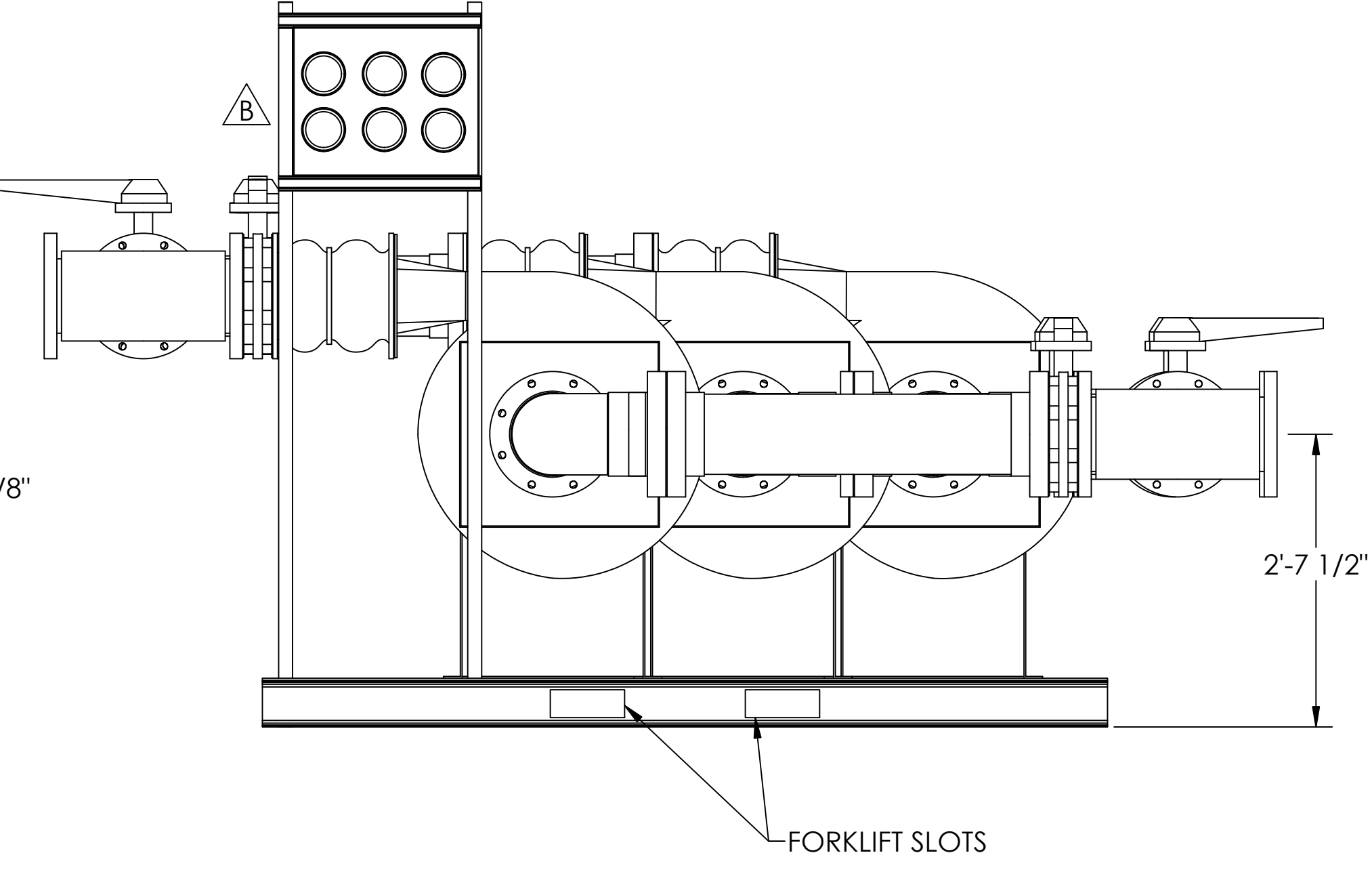
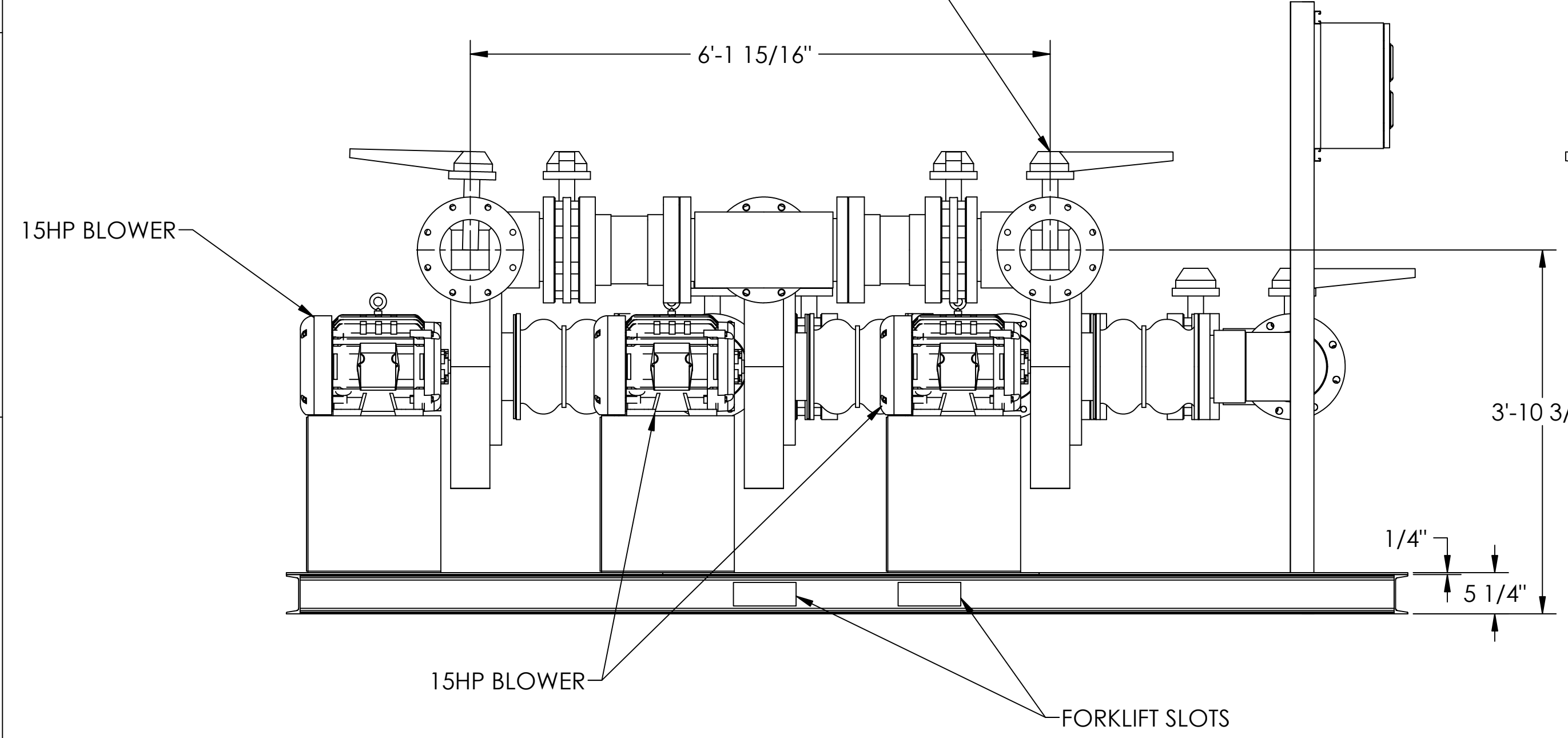
- SYSTEM COMPARES WITH SALES ORDER
- SYSTEM COMPARES WITH TECH REVIEW
- SYSTEM COMPARES WITH P & ID
- AUDIT COMPLETED-ALL FOURTH SHIFT LINE ITEMS (CPMT) MATCH WITH THE COMPONENTS ON SYSTEM
- LABOR AND PARTS PAPERWORK COMPLETED (labor sheets, pick sheets)

THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF Q.E.D ENVIRONMENTAL SYSTEMS INC. ANY REPRODUCTION IN PART OR WHOLE WITHOUT THE WRITTEN PERMISSION OF Q.E.D. ENVIRONMENTAL SYSTEM INC. IS PROHIBITED.

REVISIONS				
REV.	DESCRIPTION	REVISED BY	APPROVED	DATE
A	REVISED SKID SIZE, ADDED NOTE, TURNED THE INLET FITTINGS HORIZONTAL, ADDED PHOTOHELIC ENCLOSURE	BS	CB	9/14/05
B	REVISED BLOWER PIPING ARRANGMENT, REVISED SKID FOOT PRINT.	BS	CB	9/15/2005
C	REVISED BLOWER SPACING,	BS	CB	9/19/2005
D	ADDED PRESSURE CONNECTION LOCATION DATUM	BS	CB	12/19/2005



\triangle \ominus DENOTES PRESSURE CONNECTIONS
LOW PRESSURE CONNECTIONS WILL BE OPEN TO ATMOSPHERE.



NOTE:

- \triangle PART TO BE CLEAN AND PREPARED PER PAINT MANUFACTURER'S SPECS. PRIMER: ONE COAT RECOMMENDED PRIMER FINISH: PPG PAINT PIT GUARD COLOR: 97-148 PART A (GRAY REF) CURING AGENT 97-149 PART B
- SKID BASE IS MADE FROM C5 X 6.7# CHANNEL
- APPROXIMATE WEIGHT 2,700 LBS
- ALL PIPING IS CPVC UNLESS OTHERWISE SPECIFIED
- ALL ITEMS PROTRUDING OUTSIDE OF THE SKID FOOT PRINT WILL BE SHIPPED LOOSE.

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES AND INCLUDE PLATING. REMOVE ALL BURRS	DRAWN BY BS	DATE 9/8/05	<p>6155 JACKSON ROAD, ANN ARBOR, MI. 48103 1133 SEVENTH ST. OAKLAND, CA 94607</p>
	CHECKED BY SPICER	DATE 9/8/05	
TOLERANCES XX +/- .13 XXX +/- .005	FRACT +/- 1/4 ANGLES +/- 1/2	APPROVED BY DHE	DATE 9/8/05
OTHER TOLERANCES AS SPECIFIED			
MATERIAL			
USED ON	DO NOT SCALE DRAWING	SCALE 1:14	DWG. NO. 05T-29881

**BLOWER SKID
SHAW E & I**

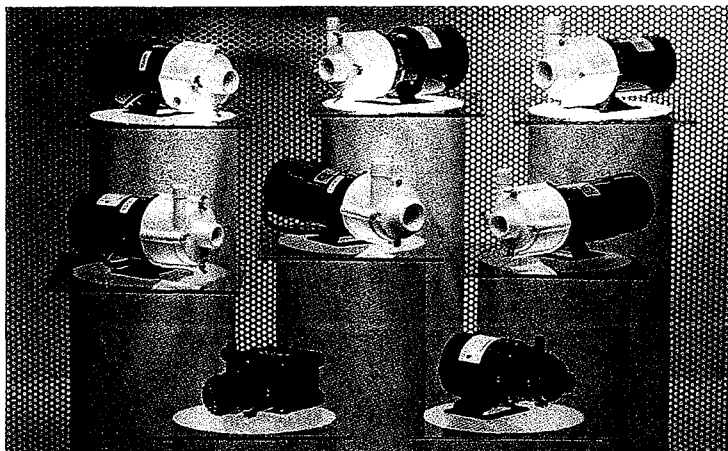
Little Giant

MAGNETIC DRIVE PUMPS

MD-SC Series Magnetic Drive for Semi-Corrosive Solutions

Features:

- Glass-filled polypropylene fluid contact.
- 99.5% pure alumina ceramic shafts and thrust washers.
- Motor selections include open, drip-proof motors with either ball or sleeve bearings.
- Totally enclosed fan-cooled (TEFC) motors with ball bearing available.
- Thermal protector and a 6 ft. 3-conductor cord with 3-prong plug.
- Fluid specific gravity up to 1.1.
- Fluid viscosity up to 100 SSU (20 cps).
- Fluid temperature up to 150°F.
- Leak-proof, sealless magnetic drive for handling semi-corrosive solutions.
- Standard nitrile O-ring.



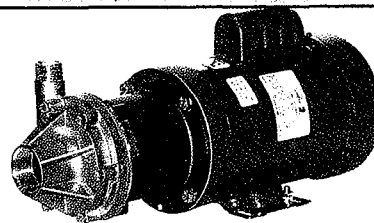
MD-SC Series Magnetic Drive for Semi-Corrosive Applications

Part Number	Model Number	Max. gpm	Max. Head	Inlet	Discharge	Motor hp	Volts	Hz	Phase	Motor Type	Ship Wt.	Price Ea.(\$)
580503	2-MD-SC	8.3	14.6	1/2" FPT	1/2" MPT	1/25	115	60	1	Open	6	157.40
581503	3-MD-SC	12.5	21.9	3/4" FPT	1/2" MPT	1/12	115	60	1	Open	8	180.90
582503	4-MD-SC	14	24.3	1" FPT	1/2" MPT	1/10	115	60	1	Open	9	217.70
582514	TE-4MD-SC	14.2	24.3	1" FPT	1/2" MPT	1/10	230	60	1	TEFC	10	250.30
583503	5-MD-SC	17.5	27.5	1" FPT	1/2" MPT	1/8	115	60	1	Open	9	311.60
584504	TE-5MD-SC	20	29.3	1" FPT	1/2" MPT	1/8	115	50/60	1	TEFC	19	452.80
585504	TE-5.5-MD-SC	32	44	1" FPT	3/4" MPT	1/4	115	50/60	1	TEFC	28	516.20
586504	TE-6MD-SC	38	54	1" FPT	3/4" MPT	1/2	115	50/60	1	TEFC	29	535.40

MD-SST Series Stainless Steel Magnetic Drive

Features:

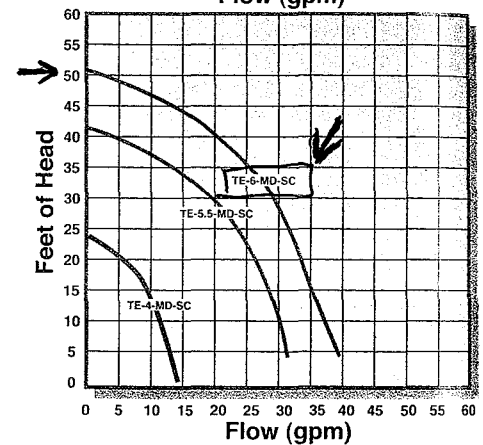
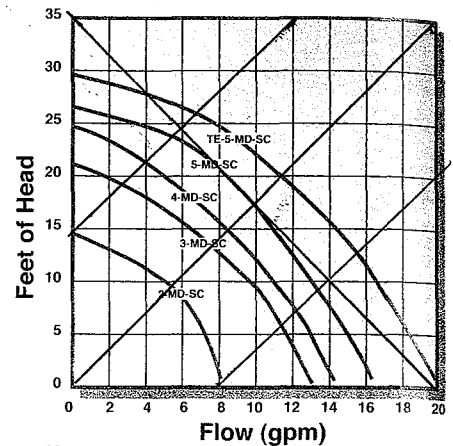
- Will handle higher viscosity liquids and solutions.
- Leak proof, sealless design for in-line non-submersible use.
- Stainless steel pump head with PTFE, carbon, ceramic and Viton parts.
- Specific gravity up to 1.2.



MD-SST Series Stainless Steel Magnetic Drive Pump

Part Number	Model Number	Volts	Hz	Phase	Motor hp	Ship Wt.	GPH @ 10'	Price Ea.(\$)
587301	TE-7-MD-SST	115/230V	50/60	1	3/4	43.3	3000	2,213.35
587302	TE-7-MD-SST	230/460V	50/60	3	3/4	36.1	3000	2,268.90
587303	TE-7-MD-SST	115/230V	50/60	1	1 1/2	50.7	3000	2,500.00
587304	TE-7-MD-SST	230/460V	50/60	3	1 1/2	42.4	3000	2,553.35

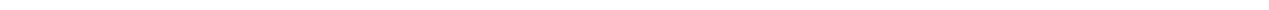
Curves based on water @ 72°F, 60 Hz



GP Se Featu

- Flows
- Head
- Close
- Wide
- Back
- Avail
- Spec
- Max

Air Stripper Operations and Maintenance



QED Environmental Systems

6155 Jackson Ave. Ann Arbor, MI 48103 Phone: 800-624-2026 Fax:734-995-1170

QED EZ-Tray™ Air Stripper System Operations and Maintenance Manual

QED Treatment Equipment, P.O.Box 3726, Ann Arbor, MI 48106
Phone: (800)-624-2026, Fax: (734)-995-1170
p/n 95168 Rev 3/18/04

***EZ-TRAY™ AIR STRIPPER
OPERATION AND MAINTENANCE MANUAL***

TABLE OF CONTENTS

Service Department Phone and Special Precautions	3
Basic System Description and Components List	4-8
Equipment Setup Procedure	9-11
System Startup Procedure	12-14
System Shutdown Procedure	15
Air Stripper Maintenance and Cleaning	16-18
Troubleshooting	19-22
QED Warranty	23-24
Figures 1-4	

Thank you for relying on QED Treatment Systems to handle your treatment needs. After reading your Operation and Maintenance Manual, if you have any questions regarding the startup or operation of your system, please contact the **QED Service and Repair Department at 1-800-624-2026.**

PLEASE NOTE!

Read your QED Operation and Maintenance Manual First!

The manual will assist you in the proper procedure for equipment hookups, installation, startup, maintenance, and troubleshooting.

It is Important That a Qualified, Licensed Electrician Perform All Electrical/Wiring Installation Work.

Please see Equipment Set-Up in the Operating Instructions section of this manual.

Follow the Manufacturers Instructions

All the mechanical equipment that was supplied with your air stripper system should include the respective manufacturer's instruction manual for each piece of equipment. The documentation will either be found with the actual piece of equipment (if shipped loose) or found within a QED Operation and Maintenance manual that includes all relevant manufacturers' instruction sheets.

Follow Safe Work Practices

Be sure to follow all associated safety practices.

BASIC SYSTEM DESCRIPTION

EZ-Tray™ systems are fabricated from rugged stainless steel, or treated carbon steel. Each system is pre-assembled and factory tested before shipment to your site. EZ-Tray™ low profile air strippers are built to meet site and project specifications, which can include a number of standard or optional pieces of equipment. Depending upon the specifics of your order, the equipment described in this manual may or may not be included with your system configuration. Please refer to your sales order for the equipment that should be included with your system. Equipment information will be found either within this O&M manual or in separate documentation provided in addition to this manual.

Air Pressure Gauge (Standard)

The standard pressure gauge reads the differential pressure between the sump pressure and atmospheric pressure, in inches of water column. The gauge is connected to the system via tubing that is attached to a pressure port on the air stripper sump. The air hose connected to the sump leads to the "high" pressure port on the gauge. The "low" pressure port is left open to the atmosphere.

Demister (Standard)

A demister pad is installed beneath the air discharge stack located on the top cover of the unit. The purpose of the demisting pad is to remove entrained water droplets that would have blown through the discharge stack. It is possible, though unlikely, that the demisting pad may become plugged or fouled. If this occurs the demisting pad is easily removed. Disconnect the vent line, take off the demister cap, and remove the demister. The demisting pad can be cleaned with a pressure washer or replaced with a new one.

Gaskets (Standard)

Three gaskets are used in the EZ-Tray™ air stripper units. One gasket is installed in the air discharge stack flange, one gasket is used to form an airtight seal between the front hatch and aeration trays, and a felt gasket is located on the underside of each aeration tray. Through the course of regular maintenance, these gaskets will eventually wear and will not seal effectively. When the gaskets are ripped, worn, or do not seal properly, these gaskets should be replaced. Contact QED for replacement gaskets and adhesive. Please contact QED prior to making any gasket repairs or adjustments.

Sight Tube (Standard)

The sight tube provides a means of easily viewing the water level in the sump tank.

Blower

The blowers on the EZ-Tray™ low profile air stripper units are typically cast aluminum type B spark resistant, direct drive @ 3450 rpm, with motor options of TEFC or EXP. Each blower is selected to meet the proper air flow requirements (cfm) at the anticipated working pressures (inches of water column) of each system.

It is critical that the blower damper be opened wide enough to provide the unit with the designated minimum flow. If the damper is opened too wide, however, high airflow can cause water entrainment, with water droplets caught up in the airstream and sent out of the air stripper discharge stack.

It is also critical that water does not enter the blower housing while the blower is in operation; this will damage your blower and void the warranty. The high water level alarm switch prevents this from happening. Make sure it is installed correctly. If not installed by QED, it is recommended that the blower piping be of an inverted-U design, capable of collecting water within the blower piping and minimizing the potential for blower flooding. Please refer to Figure 3 for a typical blower piping configuration.

If water does accumulate in the blower, it must be removed from the blower housing before continuing operation. A small drain hole may be drilled and plugged on the bottom side of the blower housing to provide a means of discharging any water that may accumulate. Remove the plug temporarily to drain any water. Else, take off the front panel of the fan housing and remove the water.

When starting the unit for the first time, *check that the blower wheel is rotating in the direction of the arrow on the blower housing*. If you hear the blower wheel rubbing or any odd sounds shut down the system immediately and call QED.

Damper

The standard QED blowers normally have a damper on the discharge side of the blower. The damper is used to make adjustments to the air flow rate (cubic feet per minute) of your system. The air flow rate is increased (higher cfm's) by opening the damper, and decreased by closing the damper.

Use the damper to adjust the sump pressure to its proper operating value. By adjusting the sump pressure, the proper operating airflow through the air stripper will be achieved. Follow the instructions given in the earlier "Air Pressure Gauge" section to obtain the correct sump operating pressure. Using an air flow meter and an air pressure gauge together is desirable for confirming airflow and sump pressure, especially when attempting to troubleshoot any problems encountered with the air stripper operation. It is also recommended that you keep a log book of pressure readings so you can determine when and the frequency of system fouling.

Air Blower Silencer

The air blower silencer reduces the dynamic noise level of the blower. The size of the silencer and the type of connection used to mount it is dictated by the size of the blower and the choice of options. If a silencer is purchased through QED, they are typically shipped loose, for customer installation. The silencer can be mounted either horizontally or vertically (through the use of an elbow) but should be properly supported to avoid over-stressing the blower housing. Silencers exposed to high wind velocities should also be properly secured.

Air Flow Meter

The air flow meter measures the amount of air flowing through the system. If it is a pitot tube-type, two air tubes lead from the air piping to a meter/gauge. To operate effectively, the pitot tube must be located a minimum required distance upstream and downstream from elbows, valves, etc. Refer to manufacturer's installation instructions for proper installation procedures.

The air flow meter typically gives readings in feet per minute, which is then multiplied by the cross sectional area, square feet, of the vent line to give cubic feet per minute (CFM). As stated in the damper section, the air flow meter is needed to make damper adjustments, especially after initial start-up.

Control Panel

The control panel serves two basic functions required for the safe operation of the system. The first is to provide the required electrical safety components for each motor (blowers and pumps) per NEC standards. These components consist of fuses, motor starters, and overload relays.

The second function is to provide the required process safety alarm components. The alarm circuit monitors the low air pressure switch and the high water level alarm switch. If either of these alarms occur then the alarm contacts will shut off the incoming water source (feed or well pumps) if the appropriate connections have been made. A qualified, licensed electrician should perform any and all electrical connections.

Control Panel Intrinsically Safe Components

EZ-Tray™ low profile air stripper systems that process potentially explosive concentrations of vapors require intrinsically safe (IS) signals to all electrical components housed in non-explosion proof enclosures. The IS signal does not have enough energy to ignite the concentration of any NEC classified explosive vapor. Typical components that need IS signals are the float switches and well probes. Determination of when IS signals are required is generally the responsibility of the groundwater remediation engineer who has placed the order for a system. A qualified, licensed electrician should perform any and all electrical connections.

Water Flow Indicators and Totalizers

The digital water flow indicator, typically installed in the incoming process water line or shipped loose, reads the rate of flow (GPM) and the totalized flow (gallons). The flow meters are selected to exceed the maximum flow of your system while providing a wide working range. The digital face plate is battery operated and intrinsically safe. The mechanical components of the meter is the turbine styled rotor which spins around a shaft that is axial to the flow of water.

The standard nutating disc meters have a totalizing function only. They operate upon the positive-displacement principle, where the flow of water through the meter moves a disc which in turn rotates a magnet. Every magnet rotation corresponds to a fixed volume of fluid which is then added to the summed total of flow.

Feed and Discharge Pumps

Any transfer pumps included in the air stripper order have been selected by our engineering staff to meet all known flow and pressure requirements. The standard pumps are typically stainless steel centrifugal-type with motor options of EXP or TEFC. The standard pumps are not self-priming; they must be primed *before starting* by filling either the discharge port or the priming port with clean water until the entire pump chamber is full. The pipe/hose leading into the pump should also be full of water, too. Install throttle valves on the discharge lines for adjusting water flowrate. The valve should be throttled back until the motor draws the nameplate current rating. Warning: If the pump is running wide open and it is not pumping against the required head, the pump will cavitate and adversely affect pump performance and pump life.

Centrifugal transfer pumps used by QED typically must be throttled back if they are not pumping against the required head. Before initial system startup, double check the pump rotation. A pump shaft rotating in the wrong direction could spin off the pump impeller and cause serious damage to the pump. Pumps operating in the wrong

rotation will show poor performance. Systems using pumps should have the flow rates tuned so that the discharge is keeping up with the feed pump.

High Water Level Alarm Switch

The high water level alarm switch is one of the two alarm interlocks that must be properly connected by a licensed electrician prior to the system's initial start-up. Please see the Special Cautions at the beginning of the Operating Instructions section for more information. The purpose of the high water level alarm switch is to prevent water from flooding the blower by shutting off the incoming contaminated water once it has reached a designated level. The high water level switch will send an alarm signal when it is approximately 3½ inches above the coupling its cord emerges from.

Line Sampling Ports

The line sampling ports provide a quick and easy means to take a water sample of both incoming contaminated water and outgoing clean water. The sampling ports are the ball valves located on both of the inlet and outlet piping. When starting the unit for the first time double check that the valves on the sample ports are closed.

When taking a water sample, open the valve and let the water flow for at least 1 minute prior to taking the sample. This purges the sample port of any stagnant water. When purging the sample port on the contaminated water line, make the contaminated water is collected in some sort of storage container and then properly dispose of the water after sampling.

Low Air Pressure Alarm Switch

The low air pressure alarm switch is one of the two alarm interlocks that must be properly connected by a licensed electrician prior to the system's initial start up. Please see the Special Cautions at the beginning of Operating Instructions section for more information. The low air pressure alarm switch monitors the blower for continuous water treatment.

Should the blower fail, the low air pressure switch should be wired to shut off all incoming water. It, like the air pressure gauge, is connected to the system via an air hose which is attached to a pressure port on the sump tank. The air hose is connected to the "high" pressure port on the switch. The "low" pressure port is open to the atmosphere. Periodically inspect and remove any water which may have accumulated in the tubing. The presence of water can affect proper switch operation.

Test the switch, at initial start up, by removing the air hose from the pressure port on the sump tank once the system is in full operation. This should set the system into an alarm condition and shut off the incoming contaminated water.

Main Disconnect Switch

The main disconnect switch removes power from the EZ-Tray™ low profile air stripper. A disconnect is required by the National Electric Code (NEC) and must be installed. Some control panels, not supplied by QED, contain an internal disconnect or circuit breaker to remove power. Disconnects supplied by QED are external to the control panel, providing flexibility in situations where a site already contains a disconnect for the air stripped system. A qualified, licensed electrician should perform any and all electrical connections.

Intermittent Operation

Some systems are ordered with the intermittent operation option. EZ-Tray™ low profile air stripper systems can be designed to run intermittently when continuous blower

operation is a concern. When the feed water is flowing into the system, the blower will be in operation and the outlet pump (if provided) will maintain proper sump tank levels. When the feed water is shut down, the blower will run for an additional period of time to treat the water that had previously entered the air stripper before shutting down. When the feed water is restored, the blower will start up to treat the new incoming water. The benefits of intermittent operation are lower operating costs, better control of noise, and longer motor life.

Water Temperature Gauge

The temperature gauges can be installed on both the inlet and outlet piping. The water temperature represents an important factor when estimating the system's performance since it directly effects removal efficiency. Temperature gauges provided by QED typically have read outs of 0-140 degrees F.

Water Pressure Gauge

Water pressure gauges can be installed on both the inlet and outlet water lines. The gauges can be used to determine the water pressures entering and exiting the system. Excessively high readings could signal that something in your system is plugged. Large fluctuations in the pressure readings could be a sign that the water flow rate is varying.

EQUIPMENT SET UP

Special Cautions!

Use a Licensed, Qualified Electrician for Any and All Electrical/Wiring Work, and Always Use Proper Work Safety Practices!

Follow All Applicable Codes

The plumbing and electrical installations must be performed by qualified personnel. All installations must be done in accordance with local, state and national codes.

Install Adequate Supports on Piping and Ductwork

The external process piping that will connect into and from the QED equipment should be properly supported to minimize stresses and vibration from non-QED equipment. The QED equipment is not designed to support the process water and air lines without proper structural support.

Do Not Run Free Product, Oil or Grease Through the Air Stripper

Free product will contaminate the unit by coating the sidewalls with a film of free-product. Air strippers are not designed to treat free product, oil, grease, or any other type of immiscible phase.

Equipment Setup Steps Depending upon how the system was ordered, some of the following instructions may not apply.

Setup Step 1. Secure/Mount the Equipment

For shipping purposes, the EZ-Tray™ unit may come either already skid-mounted or the equipment shipped loose. If shipped loose, locate the equipment as required and firmly secure to the floor, base, etc.

Setup Step 2. Install the Blower Piping

If the blower is not already pre-piped on a QED skid, install the blower piping to connect the blower outlet to the air inlet nozzle on the air stripper sump. Refer to Figure 3 for an example of a blower piping configuration.

Setup Step 3. Level the EZ-Tray™ Unit

Level the EZ-Tray™ unit. This is a critical step in the proper assembly of the equipment. The aeration trays must be as close to level as possible.

Setup Step 4. Install Discharge Piping, either gravity-discharge or pump-discharge.

Install the Gravity Discharge Pipe (For Gravity Discharge Units Only)

Refer to the outlet piping drawing in Figure 4 to assemble the piping kit and vacuum breaker. Customers providing their own gravity discharge piping must ensure that proper water sump levels are maintained during operation.

It is essential that the piping be mounted vertically and that it be properly supported. Install outlet piping from the pump's discharge port. Use proper pipe sealant, PVC cement, and proper plumbing techniques as necessary.

Caution: The vertical height of the piping should not be changed from that provided in the kit unless air stripper conditions have changed dramatically from the originally-specified flows. The piping kit includes flexible couplings to allow easy vertical height adjustment, should it be necessary.

Install the Pump Discharge Pipe (For Pump Discharge Units Only)

For a unit with a discharge pump that has not come mounted to a QED skid, install the water line from the air stripper sump to the pump inlet. If customer has purchased a QED pump kit, the components will be found in a separate box. Install outlet piping from the pump's discharge port. Use proper pipe sealant, PVC cement, and proper plumbing techniques as necessary.

Prime the pump. Allow the inlet line and pump chamber to fill completely.

Setup Step 5. Install the Sump Drain Valve and the Sight Tube (if not already installed at the factory)

Setup Step 6. Connect the Water Lines

Connect the process water lines to the inlet and discharge piping. **Firmly support the process water lines to prevent excessive stress on the piping. The piping is not designed to support the weight of the customer's process water lines.**

Use proper pipe sealant, PVC cement, and proper plumbing techniques as necessary.

Setup Step 7. Connect the Tubing Between Pressure Gauges, Pressure Switch(es), and Air Stripper Sump

Connect the air line tubing from the hose barb located on the top of the sight tube to the high pressure ports on both the air pressure gauge and the air pressure switch(es). Keep the low pressure ports open to the atmosphere (remove plugs or caps).

Setup Step 8. Install Air Discharge Stack

Install any necessary extension to the air stripper air discharge stack as necessary. **Caution: Any added extension should have an inner diameter at least as large as the air stripper stack.** Connect the stack extension to the exhaust stack using a flexible rubber coupling or other suitable means. Support the extension independently of the air stripper so that it can be easily disconnected if the demister element must be removed for maintenance purposes.

Setup Step 9. Wire the Electrical Components

Have a qualified, licensed electrician wire up the electrical components in compliance with local, state, and national codes.

IMPORTANT! Make sure the safety interlocks are connected properly! To avoid damage to the blower and flooding of the equipment with contaminated feed water, install the high water level and low air pressure interlock switches. If the water level in the sump tank rises beyond the maximum level water could

flood the blower. This will destroy the blower and void the warranty. The high water level interlock switch will shut off the feed water pump in an emergency situation. The low air pressure interlock switch will shut off the feed water pump in the event of a blower failure. This reduces the risk of having untreated water passing through the air stripper.

If QED is supplying the control panel, refer to the appropriate wiring diagrams.

Setup Step 10. Install Optional Items

Refer to manufacturers' installation instructions for all equipment and properly support all equipment in an appropriate manner. This also applies to the optional air stripper blower silencer which requires support to avoid overstressing the air stripper blower housing.

START UP

Please refer to Figures 1 and 2 at the end of this manual for a general drawing of an E-Z Tray air stripper and its aeration tray. Upon completion of the equipment set-up procedure (above), mechanical and electrical installation (including float switches, air pressure switches, etc.), proceed as follows:

Startup Step 1. Turn Off Electrical Components Using the Site's Appropriate "Lock-Out" Procedure. Close Drain and Sample Valves.

Check that all electrical components associated with the unit are turned off, and all drain and sample valves are closed.

Startup Step 2. IMPORTANT! Fill the Inlet Chambers with Clean Water.

Each downcomer (see Figures 1 and 2) must be sealed by having its end immersed in the seal pot water of the tray below it. Remove the air stripper front hatch and fill the seal pots to their proper levels (to the height of the weir). Failure to do so may create a situation where not enough back pressure is provided upon blower startup, causing the blower motor overload to trip.

Startup Step 3. IMPORTANT! Fill the Sump Tank with One Foot of Clean Water.

On initial start-up, the sump tank must be filled with clean water to a height of about one foot. The sump tank can be filled by taking off the front hatch and filling the sump directly or by disconnecting the water inlet piping and using a hose applied through the water inlet connection. The water level should be seen in the sight tube.

Startup Step 4. Power May Now Be Supplied to the System.

Startup Step 5. IMPORTANT! Check the Blower Rotation (IMPORTANT for proper air stripper operation)

Check the blower rotation by momentarily turning the Hand-Off-Auto (HOA) Switch to the "Hand" position ("bumping" the motor). Verify that the fan turns in the direction of the arrow on the blower casing. If rotation is incorrect 1) have a licensed electrician correct the wiring per manufacturer's instructions, and 2) check and correct the rotation of the other motor(s) in the system.

(This is a common oversight and very often is the reason for inadequate blower operation. If the blower is not providing the expected airflow or backpressure, please double-check this step).

Startup Step 6. Connect a Clean Water Line to the Air Stripper Inlet. Trial-run Air Stripper System Using Clean Feed Water at the Expected Flowrate.

Start the QED Air Stripper System by closing the Blower Damper and Placing the Appropriate HOA Switches in the "Auto" Position. Carefully open the damper to achieve the desired tray pressure or air flowrate at the anticipated water flowrate for the system.

Startup Step 7. Monitor the Trial Run and Adjust the System Accordingly.

The following items should be monitored as water builds up on each tray:

1. Proper sump pressure. This may require 15-30 minutes for the water to reach the proper depth on each tray. Once the blower has reached its operational speed and water flow is steady, the blower can be throttled to adjust airflow to optimal conditions. QED wet-tests every EZ-Tray unit for proper sump pressures at the customer’s expected water flow rates for “clean tray” and “fouled tray” conditions. The wet-test values are normally printed on a label and affixed to the side of the air stripper. Adjustments should be made first by referring to these wet-test pressure values. If no values are given, refer to the table below. The values are estimates, and vary depending upon the influent water flowrates. The table assumes there is no additional pressure from equipment downstream of the air stack. If downstream equipment adds backpressure, these values may not be accurate.

<u># of Trays</u>	<u>Typical Sump Operating Pressures, (approximate*)</u>
1 tray system	4-6" wc
2 tray system	8-12" wc
3 tray system	12-18" wc
4 tray system	16-24" wc
etc.	etc.

IT IS RECOMMENDED THAT A BOOSTER BLOWER BE USED IF IT IS EXPECTED THAT THE COMBINED PRESSURE LOSS OF THE QED AIR STRIPPER AND ANY DOWNSTREAM EQUIPMENT EXCEEDS 40” WC.

Be careful when making damper adjustments—fouling of the system over time will affect the air flow rate. A “fouled” system will have lower air flow at the same sump pressure reading than a clean system. A severely fouled air stripper will not produce the minimum air flow the system requires for proper performance. The blower damper should therefore be adjusted to the proper sump pressure after the trays have been properly cleaned. Refer to the “Equipment Maintenance Instructions” for proper cleaning procedures.

2. Check for any leaks and correct.

Note: If the blower overload trips, the system will shut down. This overload may indicate that the damper needs to be partially closed. Reset the overload and try to start the system again.

Once Step 7 is successfully completed, turn HOA switches to “Off” and proceed to Step 8.

Startup Step 8. Replace the Clean Water Feed Line with the Contaminated Feed Line.

Install the inlet piping according to proper plumbing practices. Use proper pipe sealant and PVC cement where necessary.

Startup Step 9. Initiate Full Operation.

Switch all air stripper system HOA switches to “Auto”.

PLEASE NOTE: The blower damper should now already be in its proper position to provide the desired airflow for the system's anticipated influent water flowrate; however, the airflow through the air stripper upon initiating "full operation" will be greater until water builds up on the trays. If this increased airflow is a concern, it is advised to close the damper slightly to throttle the airflow until the water has built up to its final height on each tray.

Startup Step 10. Inspect and Record Unit's Operation Data

Inspect the unit's operation at regular intervals and take pertinent instrument readings. Record readings and performance data in an operations log book.

Startup Step 11. Set the Throttle Valve on Discharge Pump

Units with a discharge pump are supplied with a throttle valve. The valve should be set so that the pump matches the influent flow rate without cavitation and draws no more than the rated full load amps stamped on the pump motor.

SYSTEM SHUT DOWN PROCEDURE

Shut Down Step 1. Shut Water Off

Shut off the water feed to the system.

Shut Down Step 2. Wait 5 Minutes Before Blower Shutoff

Wait 5 minutes to allow the water in the aeration trays to be completely treated, then shut off the blower.

Shut Down Step 3. Shut Power Off

Shut off power at the main disconnected switch if more than a temporary shut down is anticipated.

Caution:

If proper shut down procedures are not followed contaminated water will drain into the sump and contaminate the water that has collected in the sump. Allow the blower to run the additional 5 minutes after the feed water is shut off.

EQUIPMENT MAINTENANCE INSTRUCTIONS

This information describes how to clean the QED EZ-Tray™ Air Stripper unit. Please refer to the manufacturer's instructions for maintenance on the non-air stripper equipment.

Tray Fouling

With normal operation of the air stripper, the sump pressure will typically increase over time. This typically indicates that the air stripper trays are becoming fouled. If this occurs, shut down the system. Remove the door and visually inspect for signs of fouling and clean the air stripper as outlined in the "Maintenance" section of this manual. Occasionally inspect the pressure gauge tubing for water build up. Water trapped in the air tubing could produce an erroneous reading. A pinch clamp is provided on the tubing and should be closed when no one is at the site in order to prevent potential condensate accumulation. Condensation buildup will ruin the pressure gauge.

Dealing with High Mineral Concentrations

Minerals, dissolved in high concentrations, tend to precipitate out of groundwater during aeration processes. These minerals form insoluble deposits commonly referred to as "fouling". Deposits from iron-rich or mineral-rich feed water can be reduced by pre-treating it with sequestering agents or possibly other types of technologies. There are a number of sequestering suppliers that should be able to offer recommendations or suggestions. The recommended cleaning procedure is pressure washing. Follow the instructions detailed below.

Cleaning the Air Stripper

Recommended cleaning equipment:

Pressure Washer with Washer Wand

2 GPM minimum flow at 900 PSI maximum. Equipment rental companies can usually supply such a unit on a daily rental basis.

Clean Water Supply

Clean water supply with a capacity of at least 2 GPM at 20 PSI, connected to the pressure washer by means of an ordinary garden hose.

Cleaning the Unit. The QED air stripper is designed for easy cleaning. Trays can either be removed for cleaning or left in the unit and cleaned. Another option would be for the customer to purchase a spare set of trays which would allow maintenance personnel to replace the fouled trays with clean trays and reduce air stripper downtime and allow the maintenance personnel to clean the trays at a more convenient time.

Cleaning Step 1. Turn Off Equipment, Perform Electrical "Lockout" Procedure

Turn off the feed water supply and all associated electrical equipment.

Cleaning Step 2. Provide for Waste Disposal

Make provisions for disposing of the sludge and waste generated during cleaning.

Cleaning Step 3. Remove Front Cover(s). Either remove the trays from the air stripper unit or leave them in for cleaning.

Cleaning Step 4. Turn On Water and Pressure Washer

Turn on the water supply to the pressure washer. Then, turn on the pressure washer itself. Wear protective goggles while spraying.

Cleaning Step 5. Insert Wand into Air Stripper (This step is for cleaning trays while they remain in the air stripper unit. If trays have been removed for cleaning, skip step 5 and proceed to step 6.)

Insert the wand all the way into the door opening. Point the spray nozzle up towards the bottom of the lowest tray.

Cleaning Step 6. Clean Bottom Side of Tray

Holding the wand tightly, pull the trigger to start the pressurized water flow. Expect the wand to kick back as flow starts. Move the wand side to side at a rate of about 1" per second. Be sure to cover the entire tray bottom area. The tray holes must be cleaned of all deposits. Periodically stop the cleaning operation and inspect the cleaned area. The area is clean when there are no deposits around the aeration holes.

Cleaning Step 7. Clean Top Side of Tray

Move the wand to the top side of the tray. Continue spraying with the nozzle pointed down onto the top surface of the tray. Also clean the downcomer and sealpot areas. Remove all visible deposits from the tray baffles and the walls of the unit. Inspect the cleaned area for deposits.

Cleaning Step 8. Repeat for all Trays

Repeat the procedure for all trays, working up to the top-most tray.

Cleaning Step 9. Spray the Ceiling and Walls of the Air Stripper. If the air stripper is a mild-steel unit with coal tar epoxy coating, extra care must be taken not to remove the epoxy with the high pressure water. Cleaning the walls and ceiling are not necessarily required for proper air stripper operation.

Cleaning Step 10. Rinse

After the cleaning operation is finished, rinse the ceiling, trays, baffles, and walls with the pressure sprayer. Work down from the top down to the sump tank. Make sure the surfaces are clean and the holes are not blocked by loosened debris.

Cleaning Step 11. Check the Demister Pad and Replace as Necessary

Inspect the demister pad and clean as needed.

Use the pressure sprayer to remove debris, deposits and gummy residues sometimes found on the demister pad.

Demister pads that are excessively plugged should be replaced.

Cleaning Step 12. Inspect the Air Stripper

Visually inspect the air stripper box for the following:

1. Gasket integrity
2. a. If this is a mild steel unit, the internal and external epoxy-coatings must be inspected for exposed areas. Scratches, chips, burns, etc. will expose the mild steel to water, contaminants, and the elements, creating potential for corrosion. These exposed areas must be cleaned, dried, and re-epoxyed before commencing air stripper operation. Contact QED for touchup epoxy.
b. If this is a steel unit, inspect the air stripper for any damage and repair as necessary.
3. Aeration tray integrity. Inspect trays for structural damage, felt gasket integrity, and acceptable silicone sealant in the sealpot area. Check the downcomer of each tray for holes, rips, etc. Replace as necessary. Contact QED for replacement items.
4. Inspect the internal piping (typically PVC piping) and replace as necessary.

Cleaning Step 13. Follow Manufacturer's Instructions for Maintenance on Non-Air Stripper Equipment

TROUBLESHOOTING

Problem 1. Blower Won't Start or Run

No Power to Blower

Check that all switches are in "ON" or "AUTO" position.

Position main disconnect switch to "ON" position. Turn control switches to "ON" or "AUTO".

Blown Fuse

Check to see if fuses are okay. Check fuses in main disconnect switch and in control panel.

If blown, replace with fuse of same size and rating.

Overload Relay Trips

Locate reset button on blower overload relay.

Rush reset button in. Reasons for tripping: incorrect line voltage, motor wired incorrectly, inadequate ventilation, bearings are bad.

tubing to Pressure Switch Plugged with Water or Debris

Remove tubing from pressure switch and blow into it towards tank.

Clean or replace tubing if plugged or kinked.

Blower Wheel Jammed Against Side of Housing

TURN OFF ALL power to the system. Try to spin wheel by hand. Wheel should rotate freely. Call QED.

Problem 2. Outlet Pump Won't Shut Off

Suction or Discharge Piping for Pump is Clogged

Check water flow from discharge pipe. Piping should be clean inside. Look for narrowing caused by scale or iron accumulation.

Remove piping, inspect and clean or replace as necessary.

Float Switch in Tank is Stuck in Down Position

Look into sump and check that all floats are floating on the water.

Clean all deposits from float. Replace float is necessary.

Normal Operation - Water Level in Sump is Okay

Pump will stop when water level reaches pre-determined height in tank.

Allow water level to decrease until pump turns off.

Let water level reach pre-determined lower level, which will cause outlet pump to turn off.

Problem 3. Outlet Pump Won't Start or Run

No Power to Pump

Check that all switches are in "ON" or "AUTO" position.

Position main disconnect switch to "ON" position. Turn control switches to "ON" or "AUTO".

Blown fuse

Check to see if fuses are okay. Check fuses in main disconnect switch and in control panel.

If blown, replace with fuse of same size and rating.

Overload Relay Trips

Locate reset button on pump overload relay.

Push reset button in. Reasons for tripping: incorrect line voltage, motor wires incorrectly, inadequate ventilation, bearings are bad.

Normal Operation - Water Level in Sump is Okay

Pump will start when water level reaches pre-determined height in tank.

Allow water level to increase until pump turns on. be sure pump switch is in "Auto" position.

Let water level reach pre-determined upper level, which will cause outlet pump to turn on.

Level Switch in Tank is Wired Incorrectly in Control Panel

Check wiring circuit against diagram. See that all connections are tight and no short circuits exist because of worn insulation, crossed wires, etc.

Rewire any incorrect circuits. Tighten connections, replace defective wires.

Impeller, Seal or Bearing Damaged

TURN OFF POWER. Try to turn impeller by hand.

If impeller won't turn, remove housing and locate source of binding.

Problem 4. Low Air Pressure in Stripper Tank

Blower Damper Closed

Visually check position of damper on inlet of blower.

Open damper to get proper reading on pressure gauge. Firmly tighten screws.

Motor Rotation Backwards

Watch rotation of blower wheel at slow speed.

Reconnect for proper rotation as per motor diagram.

Gravity Discharge Trap Installed Incorrectly

Tray should be positioned vertically.

Install discharge trap per outlet plumbing drawings provided in Figure 4.

Inlet Chamber (Sealpot) in each Tray is Not Full of Water

Slide tray aside and look at water level in chamber.

Remove front cover. Fill up inlet chambers with a hose. Or, follow inlet chambers fill up procedures above in Initial Start Up.

Front Cover not in Place

Front cover must be secured during operation.

Tubing to Pressure Gauge Plugged with Water or Debris

Remove tubing from pressure gauge and blow into it towards tank.

Clean or replace tubing if plugged or kinked.

Debris Blocking Blower Intake

Look at blower intake. Remove any accumulated debris.

Normal Operation for Automatic Unit

When inlet pump starts, blowers will start, air pressure will rise to operational level.

No action necessary.

Problem 5. High Pressure in Stripper

Air Exhaust Piping is Restricted

Check vent piping for obstructions. Check that vent pipe diameter does not decrease.

Vent piping diameter must be the same as the outlet vent diameter on the cover.

Air Holes in Bottom of Trays are Plugged

Remove inspection and cleanout caps and visually inspect holes.

For iron fouling, clean out unit with a 1000 PSI pressure washer. For scaling, scrape or bang scale from all surfaces, then use a pressure washer to open holes. Consider using sequestering agent or other technology to reduce scaling.

Demister Pad is Plugged

Inspect the bottom of the demister pad in the cover. Clean and/or replace as necessary.

Problem 6. Water Won't Flow into Unit

Inlet/Well Pump Functioning Properly

Allow water level to rise in well pump, which will turn on inlet pump to system.

No action necessary.

Tank Air Pressure is Low. System is in Alarm Condition

Read tank air pressure from pressure gauge. System should be in alarm condition if pressure is below about 2 inches w.c.

Check that blower is operating properly. Check that all rubber caps are in place on end of trays.

Inlet Piping is Plugged

Remove inlet piping and inspect for debris and buildup.

Clean or replace clogged parts.

Problem 7. Iron Fouling is a Problem

Iron Precipitates Out of Water When Treated with an Air Stripper Causing Iron Build Up in Unit

Remove the front door(s) and inspect inside of tray for buildup/fouling.

Clean out unit with 1000 PSI pressure washer on routine basis.

Pretreat incoming water using sequestering agents or other appropriate technology.

QED TREATMENT EQUIPMENT WARRANTY

QED Environmental Systems Inc. (QED) warrants to the original purchaser of its products that, subject to the limitations and conditions provided below, the products, materials and/or workmanship shall reasonably conform to descriptions of the products and shall be free of defects in materials and workmanship. Any failure of the products to conform to this warranty will be remedied by QED in the manner provided herein.

QED warrants the equipment components of its manufacture for a period of one (1) year from date of delivery. Our sole obligation during this warranty will be to repair or replace (at our option) the defective components. We are not responsible for consequential damages. Labor costs are not included.

Purchaser's exclusive remedy for breach of said warranty shall be as follows: if, and only if, QED is notified in writing within the applicable warranty period of the existence of any such defects in the said products, and QED upon examination of any such defects, shall find the same to be within the term of and covered by the warranty running from QED to Purchaser, QED will, at its option, as soon as reasonably possible, replace or repair any such product, without charge to Purchaser. If QED for any reason, cannot repair a product covered hereby within four (4) weeks after receipt of the original Purchaser's notification of a warranty claim, then QED's sole responsibility shall be, at its option, either to replace the defective product with a comparable new unit at no charge to the Purchaser, or to refund the full purchase price. In no event shall such allegedly defective products be returned to QED without its consent, and QED's obligations of repair, replacement or refund are conditioned upon the Purchaser's return of the defective product to QED.

IN NO EVENT SHALL QED ENVIRONMENTAL SYSTEMS INC. BE LIABLE FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES FOR BREACH OF SAID WARRANTY.

The foregoing warranty does not apply to major subassemblies and other equipment, accessories, and other parts manufactured by others, and such other parts, accessories, and equipment are subject only to the warranties supplied by their respective manufacturers. In the event of failure of any such product or accessory, QED will give assistance to Purchaser in obtaining from the respective manufacturer whatever adjustment is reasonable in light of the manufacturer's own warranty.

THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED OR STATUTORY (INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE), WHICH OTHER WARRANTIES ARE EXPRESSLY EXCLUDED HEREBY, and of any other obligations or liabilities on the part of QED, and QED neither assumes nor authorizes any person to assume for it any other obligation or liability in connection with said products, materials and/or workmanship.

It is understood and agreed that QED shall in no event be liable for incidental or consequential damages resulting from its breach of any of the terms of this agreement, nor for special damages, nor for improper selection of any product described or referred to for a particular application.

This warranty will be void in the event of unauthorized disassembly of component assemblies. Defects in any equipment that result from abuse, operation in any manner outside the recommended procedures, use and applications other than for intended use, or exposure to chemical or physical environment beyond the designated limits of materials and construction will also void this warranty.

The equipment is warranted to perform as specified under the conditions specified here and within the air stripper model or QED will make the necessary changes at no cost to the owner. Some restrictions apply. Requirements for warranty consideration include, (but are not limited to):

1. Current operating conditions do not differ from the previously-modeled conditions.
2. The system should be cleaned regularly to maintain system performance.
3. The equipment is installed, operated and maintained according to QED's instruction or non-QED manufactured subassembly manufacturer's instructions.
4. Air stripper influent air is not "dirty" (does not contain VOC's, etc.).
5. No surfactants, oils, greases, or other immiscible phases are present in the water.
6. Each influent contaminant does not exceed 25% of its maximum solubility under modeled conditions.

QED shall be released from all obligations under all warranties if any product covered hereby is repaired or modified by persons other than QED's service personnel unless such repair by others is made with the consent of QED. If any product covered hereby is actually defective within the terms of this warranty, Purchaser must contact QED for determination of warranty coverage. If the return of a component is determined to be necessary, QED will authorize the return of the component, at owner's expense. If the product proves not to be defective within the terms of this warranty, then all costs and expenses in connection with the processing of the Purchaser's claim and all costs for repair, parts and labor as authorized by owner hereunder shall be borne by the Purchaser.

In the event of air stripper performance issues, QED may require customer to conduct a variety of troubleshooting steps. These include, but are not limited to, modifying operational parameters, cleaning air stripper system, modifying (temporarily or permanently) process piping, and obtaining reasonable and necessary influent/effluent samples. These steps are the responsibility of the customer and will be conducted by customer prior to consideration by QED for a site visit. These steps and the associated costs incurred are the responsibility of the customer, regardless of future action. Should customer request a site visit by QED or accept a site visit offer by a QED-trained technician, the visit and associated costs: a) will be the responsibility of the customer at \$500/day, plus travel, lodging, and meals, if the visit finds improper sampling, process piping installation, or equipment operation inconsistent with QED's Operation and Maintenance Manual; or b) will be the responsibility of QED if the visit finds QED responsible for the performance issue(s) raised.

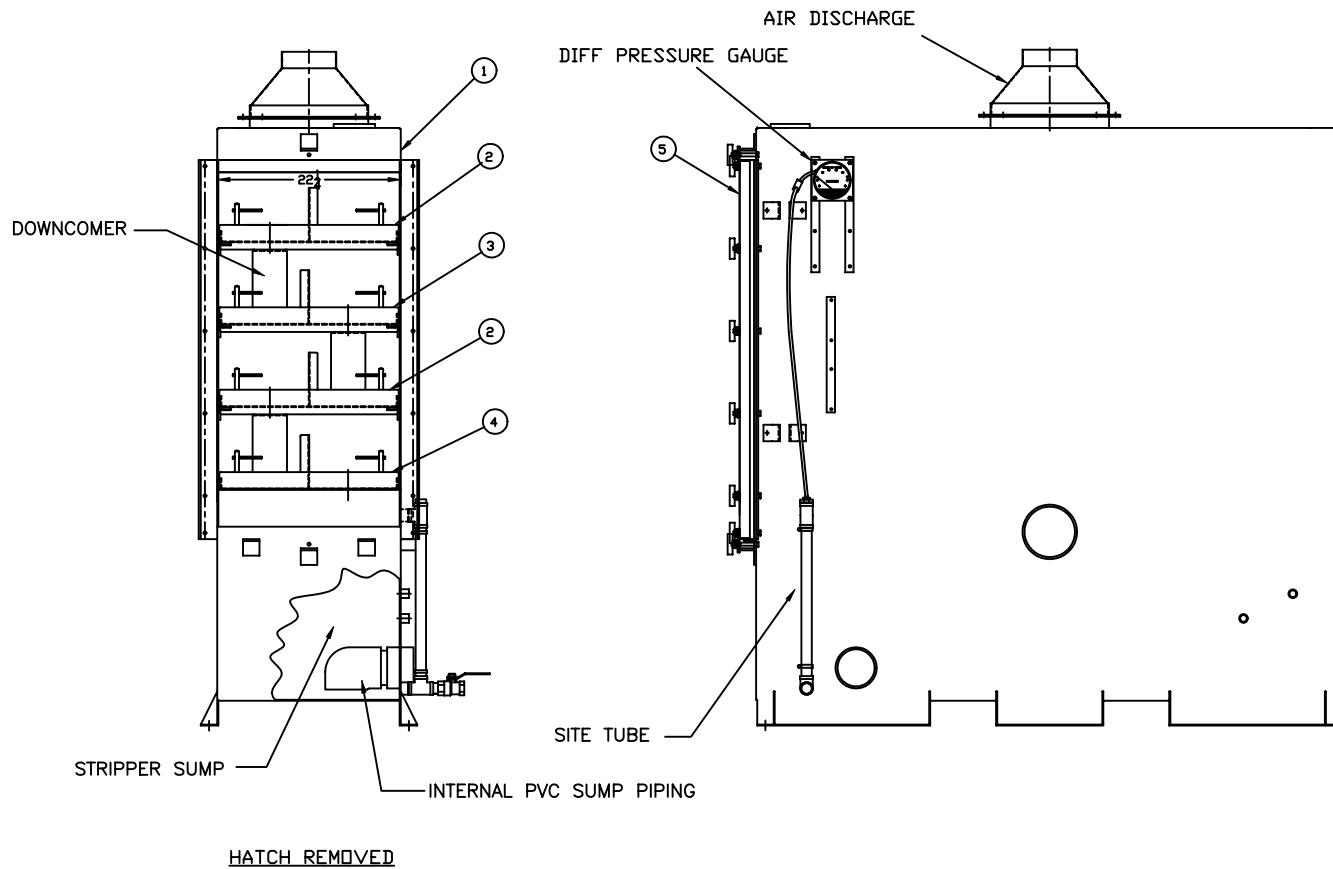
The original Purchaser's sole responsibility in the instance of a warranty claim shall be to notify QED of the defect, malfunction, or other manner in which the terms of this warranty are believed to be violated. You may secure performance of obligations hereunder by contacting the Customer Service Department of QED and:

1. Identify the product or system involved by job number or QED order number.
2. Specifying where, when, and from whom the product was purchased.
3. Describing the nature of the defect or malfunction covered by this warranty.
4. If applicable, send the malfunctioning component, *after receiving a Return Authorization Code (RAC) Number by the QED Service Department, to:*

**QED Environmental Systems Inc.
6241 Jackson Road
Ann Arbor, MI 48103**

Attn: R.A.C. No. (Return Authorization Code Number provided by QED Service Dept.)

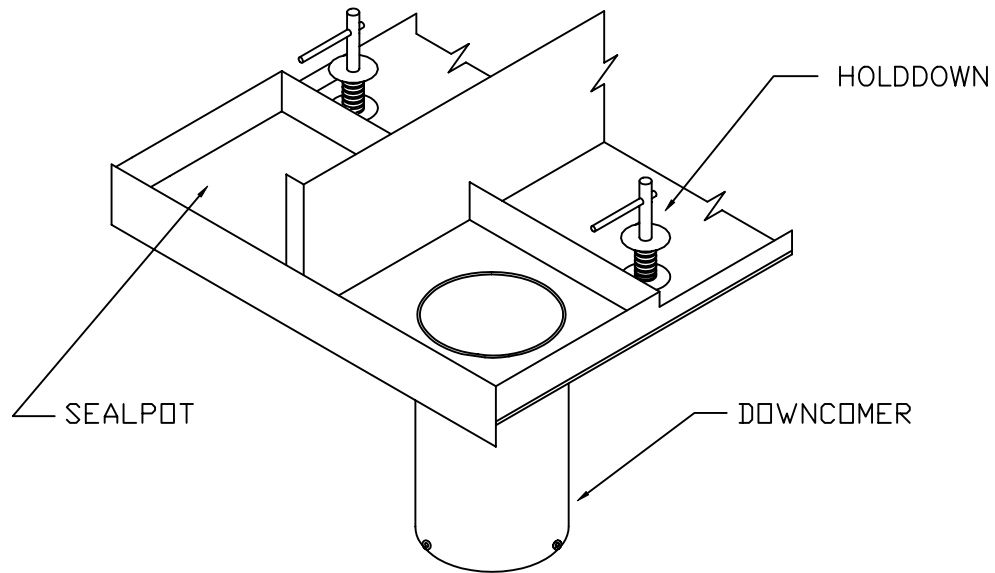
FIGURE 1. GENERAL DWG OF E-Z TRAY AIR STRIPPER



ITEM	QTY	DESCRIPTION	REMARKS
6	1	WELDMENT, DEMISTER	QED #807048
5	1	STANDARD HATCH	QED #807019
4	1	SIEVE TRAY ASSEMBLY, BOTTOM RH	QED #807062
3	1	SIEVE TRAY ASSEMBLY, INTERMEDIATE RH	QED #807056
2	2	SIEVE TRAY ASSEMBLY, INTERMEDIATE LH	QED #807059
1	1	BOX ASSEMBLY 12.4 R.H. AIR STRIPPER	QED #807044

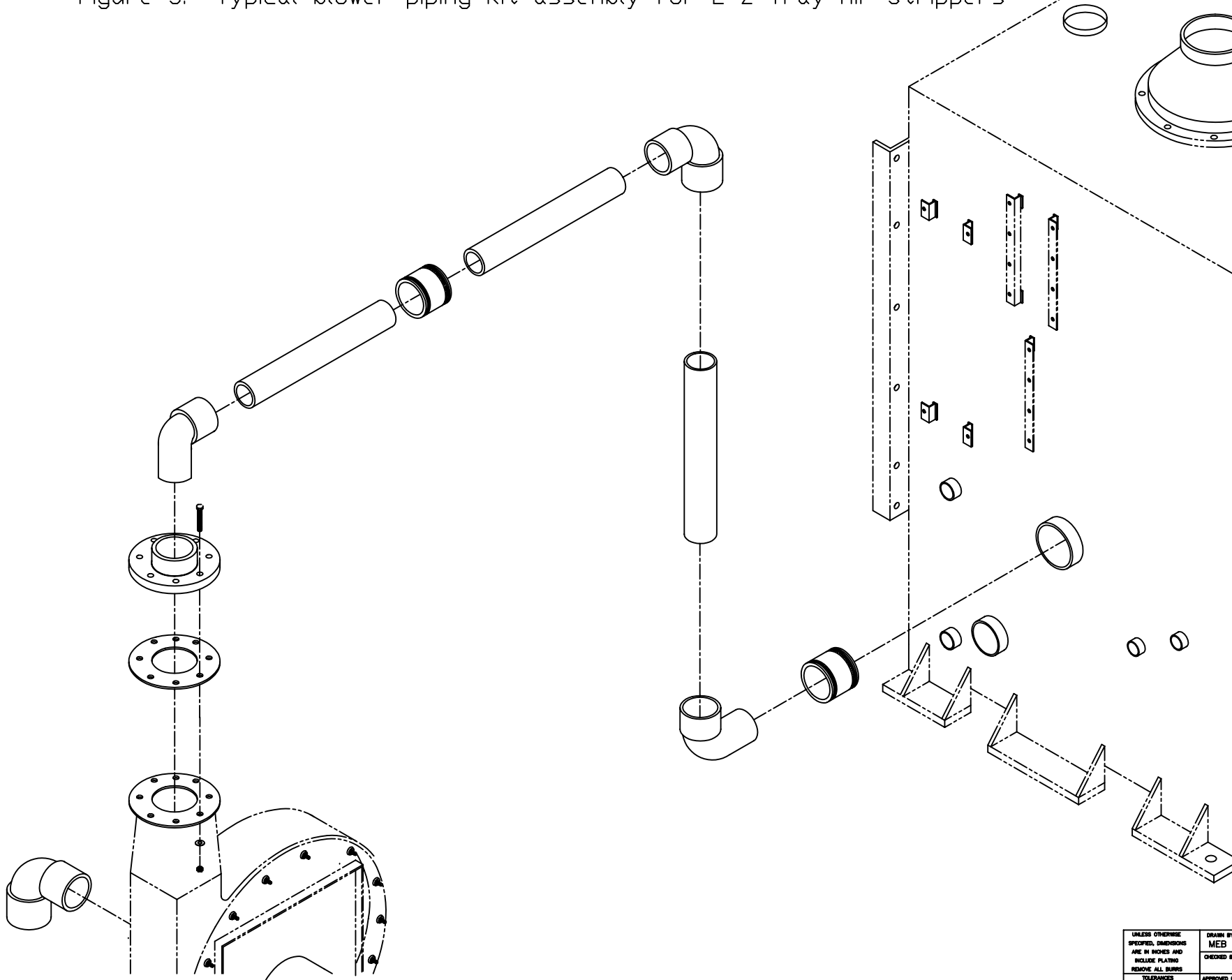
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES AND INCLUDE PLATING REMOVE ALL BURRS	DRAWN BY	DATE	Q.E.D. ENVIRONMENTAL SYSTEMS INC. 6155 JACKSON ROAD, ANN ARBOR, MI.
	MEB	01/20/97	
TOLERANCES .XX+/-01 FRACT +/-1/64 .XXX+/-005 ANGLES +/-1/2 OTHER TOLERANCES AS SPECIFIED	CHECKED BY	DATE	TITLE EZ-TRAY AIR STRIPPER DWG
	APPROVED BY	DATE	
	MFG. APPROVAL		DRAWING NUMBER eztdwg.dwg REV
	MATERIAL		SCALE _____ SHEET 1 OF 1
NEXT ASSY	USED ON	FINISH _____	

FIGURE 2. TYPICAL TRAY ASSEMBLY



ITEM QTY		DESCRIPTION		REMARKS
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES AND INCLUDE PLATING REMOVE ALL BURRS		DRAWN BY MEB	DATE 01/20/97	Q.E.D. ENVIRONMENTAL SYSTEMS INC. 6155 JACKSON ROAD, ANN ARBOR, MI.
		CHECKED BY	DATE	
TOLERANCES .00x+/-01 FRACT +/-1/64 .000x+/-005 ANGLES+/-1/2 OTHER TOLERANCES AS SPECIFIED		APPROVED BY	DATE	TITLE
		MFG. APPROVAL		TYP. TRAY ASSEMBLY
12.X, 24.X AIR STRIPPER		MATERIAL		DRAWING NUMBER TRAY
NEXT ASS'Y	USED ON	FINISH	SCALE	REV A SHEET 1 OF 1

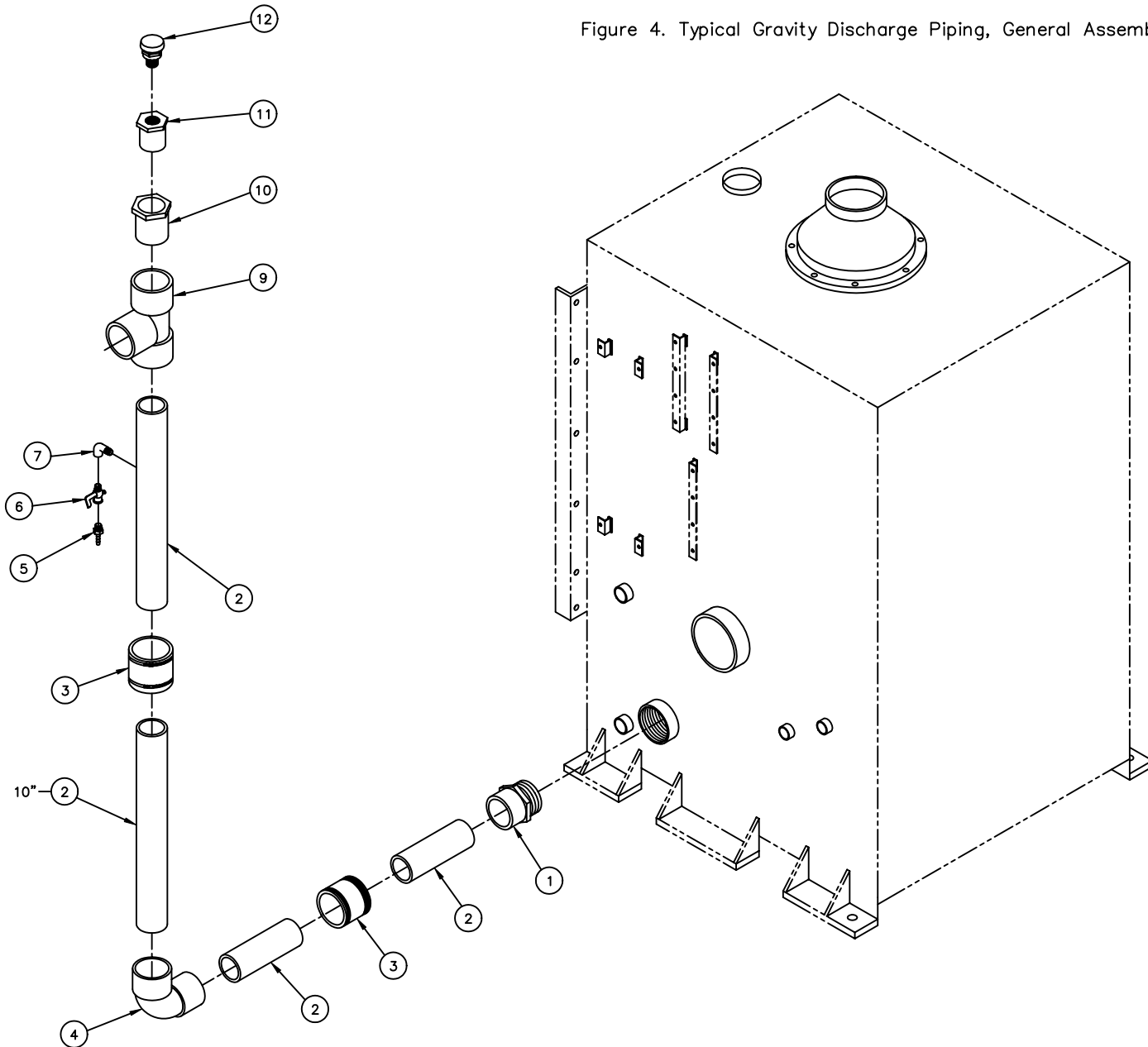
Figure 3. Typical blower piping kit assembly for E-Z Tray Air Strippers



2/18/99, meb

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES AND INCLUDE PLATING REMOVE ALL BURRS	DRAWN BY	DATE	Q.E.D. ENVIRONMENTAL SYSTEMS INC. 8155 JACKSON ROAD, ANN ARBOR, MI.
	MEB	9/16/97	
TOLEANCES	APPROVED BY	DATE	TITLE BLOWER KIT W/O BLOWER ASSEMBLY/BOM/KIT
200+/- .01 FRACT +/- 1/64 3000+/- .005 ANGLES +/- 1/2 OTHER TOLERANCES AS SHOWN			
	MATERIAL		DRAWING NUMBER eztblkt.dwg REV A
NEXT ASSY	USED ON	FINISH	SCALE N.T.S. SHEET 1 OF 1


Figure 4. Typical Gravity Discharge Piping, General Assembly



NOTE:

1. CENTER LINE OF WATER OUT (ITEM 1)
TO CENTER LINE OF DRAIN CONNECTOR
(ITEM 9) TO BE 27" - 6 TRAY
18" - 4 TRAY

(DIMENSIONS ARE APPROXIMATE--REQUIRES SOME ADJUSTMENT
AS NECESSARY BASED UPON SUMP PRESSURES AND WATER FLOWS.
ASSUMES STANDARD OPERATING CONDITIONS.)

12	1	BREAKER, VACUUM RELIEF 1/2"							
11	1	BUSHING, SPI X THD PVC SCH 80							
10	1	BUSHING, REDUCER SPI. X SOC.							
9	1	TEE, SOCKET PVC SCH 80							
8									
7	1	ELBOW, STREET 1/8" FPT BRASS							
6	1	COCK, SHUTOFF 1/8"MPT X 1/8"FPT BRASS							
5	1	BARB, 1/8"MPT X 3/16" BARB							
4	1	ELBOW, 90 DEGREE PVC SCH 80 SOCKET							
3	2	FERNCO, FLEXIBLE PVC							
2	TBD	PIPE, PVC SCH 80							
1	1	ADAPTER, PVC SCH 80							
ITEM	QTY	DESCRIPTION	PART #						
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES AND INCLUDE PLATING REMOVE ALL BURRS		<table border="1"> <tr> <td>DRAWN BY</td> <td>DATE</td> </tr> <tr> <td>MEB</td> <td>10/29/99</td> </tr> <tr> <td>CHECKED BY</td> <td>DATE</td> </tr> </table>	DRAWN BY	DATE	MEB	10/29/99	CHECKED BY	DATE	 ENVIRONMENTAL SYSTEMS INC. 6155 JACKSON ROAD, ANN ARBOR, MI.
DRAWN BY	DATE								
MEB	10/29/99								
CHECKED BY	DATE								
TOLERANCES .XX+/-01 FRACT +/-1/64 .XXX+/-005 ANGLES +/-1/2 OTHER TOLERANCES AS SPECIFIED		<table border="1"> <tr> <td>APPROVED BY</td> <td>DATE</td> </tr> <tr> <td>MFG. APPROVAL</td> <td></td> </tr> <tr> <td>MATERIAL</td> <td></td> </tr> </table>	APPROVED BY	DATE	MFG. APPROVAL		MATERIAL		
APPROVED BY	DATE								
MFG. APPROVAL									
MATERIAL									
EZ-TRAY (24.X)			TITLE GRAVITY DRAIN ASSEMBLY/BOM/KIT						
NEXT ASS'Y	USED ON	FINISH	DRAWING NUMBER eztgravdis REV						
			SCALE N.T.S. SHEET 1 OF 1						

nybThe
**New York Blower
Company®**7660 QUINCY STREET—WILLOWBROOK, ILLINOIS 60527-5530
TEL: (630) 794-5700 • FAX: (630) 794-5776 • WEB: <http://www.nyb.com> • E-MAIL: nyb@nyb.comINSTALLATION,
MAINTENANCE,
OPERATING
INSTRUCTIONS**IM-140****PRESSURE BLOWERS
TYPE HP PRESSURE BLOWERS****SOUND**

Some fans can generate sound that could be hazardous to exposed personnel. It is the responsibility of the system designer and user to determine sound levels of the system, the degree of personnel exposure, and to comply with applicable safety requirements to protect personnel from excessive noise. Consult **nyb** for fan sound power level ratings.

AIR PRESSURE AND SUCTION

In addition to the normal dangers of rotating machinery, fans present another hazard from the suction created at the fan inlet. This suction can draw materials into the fan where they become high velocity projectiles at the outlet. It can also be extremely dangerous to persons in close proximity to the inlet, as the forces involved can overcome the strength of most individuals. Inlets and outlets that are not ducted should be screened to prevent entry and discharge of solid objects.

! WARNING

THIS FAN HAS MOVING PARTS THAT CAN CAUSE SERIOUS BODILY INJURY. BEFORE OPERATING OR STARTING MAINTENANCE READ THE INSTALLATION AND MAINTENANCE INSTRUCTIONS AND THE AMCA SAFETY PRACTICES MANUAL PROVIDED WITH THIS FAN.

DURING OPERATION

1. KEEP BODY, HANDS, AND FOREIGN OBJECTS AWAY FROM THE INLET, THE OUTLET, AND THE OTHER MOVING PARTS OF THE FAN SUCH AS SHAFTS, BELTS, AND PULLEYS.

2. DO NOT OPERATE AT EXCESSIVE SPEEDS OR TEMPERATURES.

BEFORE STARTING MAINTENANCE WORK:

LOCK POWER SUPPLY IN OFF POSITION AND IMMOBILIZE FAN WHEEL.

98-0250

A WORD ABOUT SAFETY

The above **WARNING** decal appears on all **nyb** fans. Air moving equipment involves electrical wiring, moving parts, sound, and air velocity or pressure which can create safety hazards if the equipment is not properly installed, operated and maintained. To minimize this danger, follow these instructions as well as the additional instructions and warnings on the equipment itself.

All installers, operators and maintenance personnel should study AMCA Publication 410, "Recommended Safety Practices for Air Moving Devices", which is included as part of every shipment. Additional copies can be obtained by writing to New York Blower Company, 7660 Quincy St., Willowbrook, IL 60527.

ELECTRICAL DISCONNECTS

Every motor driven fan should have an independent disconnect switch to isolate the unit from the electrical supply. It should be near the fan and must be capable of being locked by maintenance personnel while servicing the unit, in accordance with OSHA procedures.

MOVING PARTS

All moving parts must have guards to protect personnel. Safety requirements vary, so the number and type of guards needed to meet company, local and OSHA standards must be determined and specified by the user. Never start a fan without having all safety guards installed. Check regularly for damaged or missing guards and do not operate any fan with guards removed. Fans can also become dangerous because of potential "wind-milling", even though all electrical power is disconnected. Always block the rotating assembly before working on any moving parts.

! DANGER

DO NOT OPEN UNTIL THE POWER SUPPLY HAS BEEN LOCKED OFF AND THE SHAFT HAS STOPPED ROTATING. FAILURE TO DO THIS CAN RESULT IN SERIOUS BODILY INJURY.

98-0249

ACCESS DOORS

The above **DANGER** decal is placed on all **nyb** cleanout doors. These doors, as well as access doors to the duct system, should never be opened while the fan is in operation. Serious injury could result from the effects of air pressure or suction.

Bolted doors must have the door nuts or fasteners securely tightened to prevent accidental or unauthorized opening.

RECEIVING AND INSPECTION

The fan and accessories should be inspected on receipt for any shipping damage. Turn the wheel by hand to see that it rotates freely and does not bind. If dampers or shutters are provided, check these accessories for free operation of all moving parts.

F.O.B. factory shipping terms require that the receiver be responsible for inspecting the equipment upon arrival. Note damage or shortages on the Bill of Lading and file any claims for damage or loss in transit. **nyb** will assist the customer as much as possible; however, claims must be originated at the point of delivery.

HANDLING AND STORAGE

Fans should be lifted by the base, mounting supports, or lifting eyes only. Never lift a fan by the wheel, shaft, motor, motor bracket, housing inlet, outlet, or any fan part not designed for lifting. A spreader should always be used to avoid damage.

On a direct drive Arrangement 8 fan, lifting holes are provided in the motor base to assist in handling the fan assembly. These lifting holes should be used in conjunction with the lifting eyes when lifting and positioning the fan onto its foundation. A heavy round steel bar or appropriate fixture can be passed through the lifting holes to simplify attachment of the lifting device. Be sure to follow all local safety codes when moving heavy equipment.

Whenever possible, fans and accessories should be stored in a clean, dry location to prevent rust and corrosion of steel components. If outdoor storage is necessary, protection should be provided. Cover the inlet and outlet to prevent the accumulation of dirt and moisture in the housing. Cover motors with waterproof material. Refer to the bearing section for further storage instructions.

Check shutters for free operation and lubricate moving parts prior to storage. Inspect the stored unit periodically. **Rotate the wheel by hand every two weeks to redistribute grease on internal bearing parts.**

FAN INSTALLATION

nyb wheels are dynamically balanced when fabricated. Complete assembled fans are test run at operating speeds to check the entire assembly for conformance to **nyb** vibration limits. Nevertheless, all units must be adequately supported for smooth operation. **Ductwork or stacks should be independently supported as excess weight may distort the fan housing and cause contact between moving parts.** Where vibration isolators are used, consult the **nyb** certified drawing for proper location and adjustment.

Slab-Mounted Units

A correctly designed and level concrete foundation provides the best means of installing floor-mounted fans. The mass of the base must maintain the fan/driver alignment, absorb normal vibration, and resist lateral loads. The overall dimensions of the concrete base should extend at least six inches beyond the base of the fan. The weight of the slab should be two to three times the weight of the rotating assembly, including the motor. The foundation requires firmly anchored fasteners such as the anchor bolts shown in Figure 1.

Move the fan to the mounting location and lower it over the anchor bolts, leveling the fan with shims around the bolts. Fasten the fan securely. When grout is used, shim the fan at least 3/4-inch from the concrete base. (See Figure 1.) When isolation is used, check the **nyb** certified drawing for installation instructions.

Elevated Units

When an elevated or suspended structural steel platform is used, it must have sufficient bracing to support the unit load and prevent side sway. The platform should be of welded construction to maintain permanent alignment of all members.

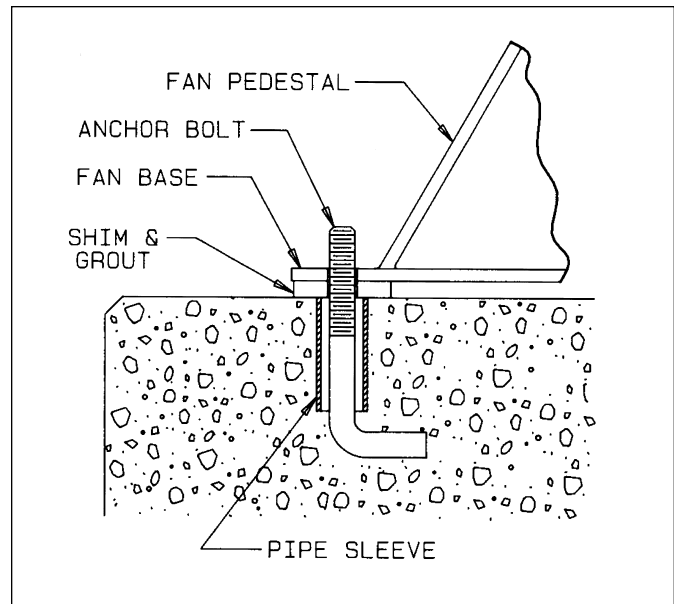


Figure 1

V-BELT DRIVE

Installation

1. Remove all foreign material from the fan and motor shafts. Coat shafts with machine oil for easier mounting. Mount the belt guard backplate at this time if partial installation is required prior to sheave mounting.
2. Mount sheaves on shafts after checking sheave bores and bushings for nicks or burrs. Avoid using force. If resistance is encountered, lightly polish the shaft with emery cloth until the sheave slides on freely. Tighten tapered bushing bolts sequentially so that equal torque is applied to each.
3. Adjust the motor on its base to a position closest to the fan shaft. Install belts by working each one over the sheave grooves until all are in position. Never pry the belts into place. On **nyb** packaged fans, sufficient motor adjustment is provided for easy installation of the proper size belts.
4. Adjust sheaves and the motor shaft angle so that the sheave faces are in the same plane. Check this by placing a straightedge across the face of the sheaves. Any gap between the edge and sheave faces indicates misalignment. Important: This method is only valid when the width of the surface between the belt edge and the sheave face is the same for both sheaves. When they are not equal, or when using adjustable-pitch sheaves, adjust so that all belts have approximately equal tension. Both shafts should be at the right angles to the center belt.

Belt Tensioning

1. Check belt tension with a tensioning gage and adjust using the motor slide base. Excess tension shortens bearing life while insufficient tension shortens belt life, can reduce fan performance and may cause vibration. The lowest allowable tension is that which prevents slippage under full load. Belts may slip during start-up, but slipping should stop as soon as the fan reaches full speed. For more precise tensioning methods, consult the drive manufacturer's literature.
2. Recheck setscrews, rotate the drive by hand and check for rubbing, then complete the installation of the belt guard.

- Belts tend to stretch somewhat after installation. Recheck tension after several days of operation. Check sheave alignment as well as setscrew and/or bushing bolt tightness.

COUPLING

Coupling alignment should be checked after installation and prior to start up. Alignment is set at the factory, but shipping, handling, and installation can cause misalignment. Also check for proper coupling lubrication. For details on lubrication and for alignment tolerances on the particular coupling supplied, see the manufacturer's installation and maintenance supplement in the shipping envelope.

Installation

Most **nyb** fans are shipped with the coupling installed. In cases where the drive is assembled after shipping, install the coupling as follows:

- Remove all foreign material from fan and motor shafts and coat with machine oil for easy mounting of coupling halves.
- Mount the coupling halves on each shaft, setting the gap between the faces specified by the manufacturer. Avoid using force. If mounting difficulty is encountered, lightly polish the shaft with emery cloth until the halves slide on freely.

Alignment

- Align the coupling to within the manufacturer's limits for parallel and angular misalignment (see Figure 2). A dial indicator or laser can also be used for alignment where greater precision is desired. Adjustments should be made by moving the motor to change shaft angle, and by the use of foot shims to change motor shaft height. Do not move the fan shaft or bearing.
- When correctly aligned, install the flexible element and tighten all fasteners in the coupling and motor base. Lubricate the coupling if necessary.
- Recheck alignment and gap after a short period of operation, and recheck the tightness of all fasteners in the coupling assembly.

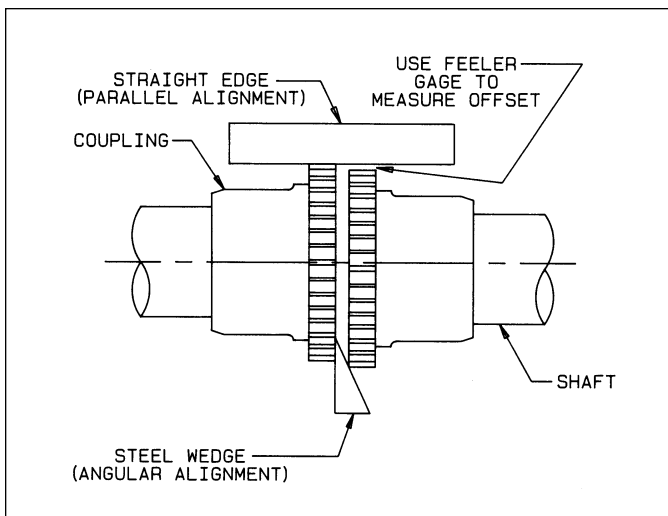


Figure 2

START-UP

Safe operation and maintenance includes the selection and use of appropriate safety accessories for the specific installation. This is the responsibility of the system designer and requires consideration of equipment location and accessibility as well as adjacent components. All safety accessories must be installed properly prior to start-up.

Safe operating speed is a function of system temperature and wheel design. Do not under any circumstances exceed the maximum safe fan speed published in the **nyb** engineering supplement, which is available from your **nyb** field sales representative.

! CAUTION

BEFORE INITIAL OPERATION:

- 1. TIGHTEN ALL SET SCREWS IN FAN WHEEL.**
- 2. TIGHTEN ALL SET SCREWS IN BEARINGS.**
- 3. REPEAT AFTER 8 HOURS OF OPERATION.**
- 4. REPEAT AGAIN AFTER TWO WEEKS OPERATION.**

98-0271

Procedure

- If the drive components are not supplied by **nyb**, verify with the manufacturer that the starting torque is adequate for the speed and inertia of the fan.
- Inspect the installation prior to starting the fan. Check for any loose items or debris that could be drawn into the fan or dislodged by the fan discharge. Check the interior of the fan as well. Turn the wheel by hand to check for binding.
- Check drive installation and belt tension.
- Check the tightness of all setscrews, nuts and bolts. When furnished, tighten hub setscrews with the wheel oriented so that the setscrew is positioned underneath the shaft.
- Install all remaining safety devices and guards. Verify that the supply voltage is correct and wire the motor. "Bump" the starter to check for proper wheel rotation.
- Use extreme caution when testing the fan with ducting disconnected. Apply power and check for unusual sounds or excessive vibration. If either exists, see the section on Common Fan Problems. To avoid motor overload, do not run the fan for more than a few seconds if ductwork is not fully installed. On larger fans, normal operating speed may not be obtained without motor overload unless ductwork is attached. Check for correct fan speed and complete installation. Ductwork and guards must be fully installed for safety.
- Setscrews should be rechecked after a few minutes, eight hours and two weeks of operation (see Tables 1 & 2 for correct tightening torques).

NOTE: Shut the fan down immediately if there is any sudden increase in fan vibration.

Table 1 - WHEEL SETSCREW TORQUES

Setscrew Size Diameter (in.)	Carbon Steel Setscrew Torque*	
	lb.-in.	lb.-ft.
1/2	600	50
5/8	--	97
3/4	--	168

* Stainless Steel setscrews are not hardened and should not be tightened to more than 1/2 the values shown.

Table 2 - BEARING SETSCREW TORQUE, lb.-in.

Setscrew Diameter	Manufacturer				
	Link-Belt	Sealmaster	SKF	McGill	Dodge
1/4	90	65	50	85	--
5/16	185	125	165	165	160

Note: Split pillow block bearings are fixed to the shaft with tapered sleeves and generally do not have setscrews.

FAN MAINTENANCE

nyb fans are manufactured to high standards with quality materials and components. Proper maintenance will ensure a long and trouble-free service life.

Do not attempt any maintenance on a fan unless the electrical supply has been completely disconnected and locked. In many cases, a fan can windmill despite removal of all electrical power. The rotating assembly should be blocked securely before attempting maintenance of any kind.

The key to good fan maintenance is regular and systematic inspection of all fan parts. Inspection frequency is determined by the severity of the application and local conditions. Strict adherence to an inspection schedule is essential.

Regular fan maintenance should include the following:

1. Check the fan wheel for any wear or corrosion, as either can cause catastrophic failures. Check also for the build-up of material which can cause unbalance resulting in vibration, bearing wear and serious safety hazards. Clean or replace the wheel as required.
2. Check the V-belt drive for proper alignment and tension (see section on V-belt drives). If belts are worn, replace them as a set, matched to within manufacturer's tolerances. Lubricate the coupling of direct-drive units and check for alignment (see section on couplings).
3. Lubricate the bearings, but do not over lubricate (see the bearing section for detailed specifications).
4. Ceramic-felt shaft seals require no maintenance, although worn seals should be replaced. When lip-type shaft seals are provided, lubricate them with "NEVER-SEEZ" or other anti-seize compound.
5. During any routine maintenance, all setscrews and bolts should be checked for tightness. See the table for correct torques.
6. When installing a new wheel, the proper wheel-to-inlet clearance must be maintained (see Figure 3).

WHEEL BALANCE

Airstreams containing particulate or chemicals can cause abrasion or corrosion of the fan parts. This wear is often uneven and can lead to significant wheel unbalance over time. When such wear is discovered, a decision must be made as to whether to rebalance or replace the wheel.

The soundness of all parts should be determined if the original thickness of components is reduced. Be sure there is no hidden structural damage. The airstream components should also be cleaned to remove any build-up of foreign material. Specialized equipment can be used to rebalance a cleaned wheel that is considered structurally sound.

Balance weights should be rigidly attached at a point that will not interfere with the housing nor disrupt airflow. Remember that centrifugal forces can be extremely high at the outer radius of a fan wheel. Welding is the preferred method of balance weight attachment. Be sure to ground the welder directly to the fan wheel. Otherwise, the welding current could pass through the fan bearings and damage them.

WHEEL-INLET CLEARANCE

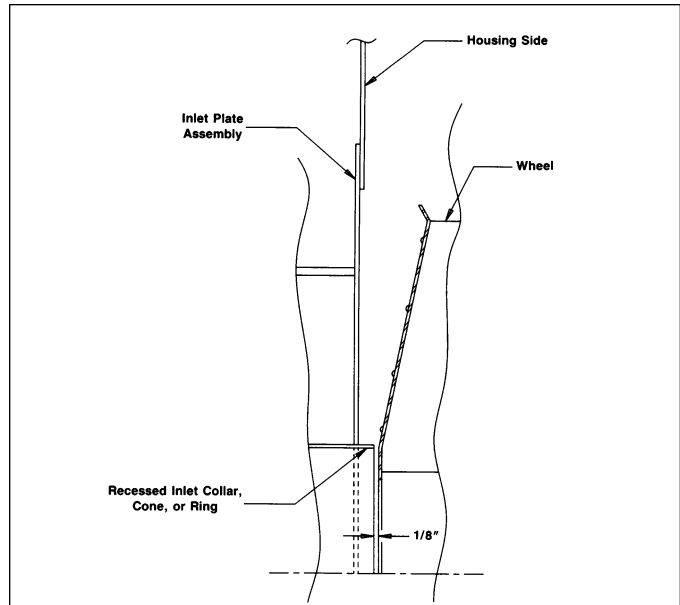


Figure 3

BEARINGS

Storage

Any stored bearing can be damaged by condensation caused by temperature variations. Therefore, nyb fan bearings are filled with grease at the factory to exclude air and moisture. Such protection is adequate for shipment and subsequent immediate installation.

For long term or outdoor storage, mounted bearings should be regreased and wrapped with plastic for protection. **Rotate the fan wheel by hand at least every two weeks to redistribute grease on internal bearing parts.** Each month the bearings should be purged with new grease to remove condensation, since even a filled bearing can accumulate moisture. Use caution when purging, as excessive pressure can damage the seals. Rotate the shaft while slowly adding grease.

Operation

Check the setscrew torque before start-up (see table for correct values). Since bearings are completely filled with grease at the factory, they may run at an elevated temperature during initial operation. Surface temperatures may reach 180°F. and grease may bleed from the bearing seals. This is normal and no attempt should be made to replace lost grease. Bearing surface temperatures will decrease when the internal grease quantity reaches a normal operating level. Relubrication should follow the recommended schedule.

Lubrication

Use the table for relubrication scheduling according to operating speed and shaft diameter. Bearings should be lubricated with a premium quality lithium-based grease conforming to NLGI Grade 2. Examples are:

Mobil - Mobilith AW2 Chevron - Amolith #2
 Texaco - Premium RB Shell - Alvania #2

These greases are for bearing surface temperatures of 40°F to 180°F. For surface temperatures of 181°F to 230°F, use Mobilith SHC220.

Do not use "high temperature" greases, as many are not formulated to be compatible with fan bearings.

Add grease to the bearing while running the fan or rotating the shaft by hand. Be sure all guards are in place if lubrication is performed while the fan is operating. Add just enough grease to cause a slight purging at the seals. Except on split pillowblocks, completely filled bearings will run hotter until a sufficient amount of grease is purged out of the seals.

Split pillowblock bearings (Link-Belt P-LB6800 & P-LB6900, SKF SAF 22500, Dodge SAF-XT) should be cleaned and repacked at approximately every eighth lubrication interval. This requires removal of the bearing cap. Clean out old grease and repack the bearing with fresh grease. Pack the bearing fully and fill the housing reservoir to the bottom of the shaft on both sides of the bearing. Replace the bearing cap, being careful not to mix caps as they are not interchangeable from one bearing to another. **Do not over lubricate.**

Excessive Vibration

A common complaint regarding industrial fans is "excessive vibration". **nyb** is careful to ensure that each unit is precisely balanced prior to shipment; however, there are many other causes of vibration including:

1. Loose mounting bolts, setscrews, bearings or couplings.
2. Misalignment or excessive wear of couplings or bearings.
3. Misaligned or unbalanced motor.
4. Bent shaft due to mishandling or material impact.
5. Accumulation of foreign material on the wheel.
6. Excessive wear or erosion of the wheel.
7. Excessive system pressure or restriction of airflow due to closed dampers.
8. Inadequate structural support, mounting procedures or materials.
9. Externally transmitted vibration.

Inadequate Performance

1. Incorrect testing procedures or calculations.
2. Fan running too slowly.
3. Fan wheel rotating in wrong direction or installed backwards on shaft.
4. Wheel not properly centered relative to inlet cone.
5. Damaged or incorrectly installed cut off sheet or diverter.
6. Poor system design, closed dampers, air leaks, clogged filters, or coils.
7. Obstructions or sharp elbows near inlets.
8. Sharp deflection of airstream at fan outlet.

Excessive Noise

1. Fan operating near "stall" due to incorrect system design or installation.
2. Vibration originating elsewhere in the system.
3. System resonance or pulsation.
4. Improper location or orientation of fan intake and discharge.
5. Inadequate or faulty design of supporting structures.
6. Nearby sound reflecting surfaces.
7. Loose accessories or components.
8. Loose drive belts.
9. Worn bearings.

BEARING LUBRICATION INTERVAL [months]

RPM Shaft	1 - 500	501- 1000	1001- 1500	1501- 2000	2001- 2500	2501- 3000	3001- 3500	3501- 4000
1 7/16	6	6	4	5-6	4-6	4-6	3-5	2-4
1 11/16	6	6	4	4-6	4-6	2	4-6	2-4
2 3/16	6	6	4	4-6	4-6	1	2-4	2
2 7/16	6	6	4	4-6	4-6	4	2-4	2
2 15/16	6	6	4	4-6	4-6	2-4	2	1-2

Ball Bearings & Split Pillowblock Spherical Rotor Bearings  Non-Split Pillowblock Spherical Roller Bearings

NOTE:

1. These are general recommendations only; specific manufacturer's recommendations may vary slightly.
2. Assumes clean environment, -20°F to 120°F.
 - a. Consult The New York Blower Company for operation below -20°F, ambient.
 - b. Ambient temperatures greater than 120°F, will shorten bearing life.
 - c. Under extremely dirty conditions, lubricate more frequently.
3. Assumes horizontal mounting configuration. For vertically mounted applications, lubricate twice as frequently.

COMMON FAN PROBLEMS

Premature Component Failure

1. Prolonged or major vibration.
2. Inadequate or improper maintenance.
3. Abrasive or corrosive elements in the airstream or surrounding environment.
4. Misalignment or physical damage to rotating components or bearings.
5. Bearing failure from incorrect or contaminated lubricant or grounding through the bearings while arc welding.
6. Excessive fan speed.
7. Extreme ambient or airstream temperatures.
8. Improper belt tension.
9. Improper tightening of wheel setscrews.

REPLACEMENT PARTS

It is recommended that only factory-supplied replacement parts be used. **nyb** fan parts are built to be fully compatible with the original fan, using specific alloys and tolerances. These parts carry a standard **nyb** warranty.

When ordering replacement parts, specify the part name, **nyb** shop and control number, fan size, type, rotation (viewed from drive end), arrangement and bearing size or bore. Most of this information is on the metal nameplate attached to the fan base. For assistance in selecting replacement parts, contact your local **nyb** representative or visit: <http://www.nyb.com>.

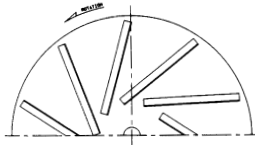
Example: Part required: Wheel/shaft assembly
 Shop/control number: B-10106-100
 Fan description: Size 2206A10 Pressure Blower
 Rotation: Clockwise
 Arrangement: 4

Suggested replacement parts include:

Wheel Component parts: Damper
 Shaft ● Motor
 Bearings* Coupling*
 Shaft Seal* Shaaves*
 V-Belts*

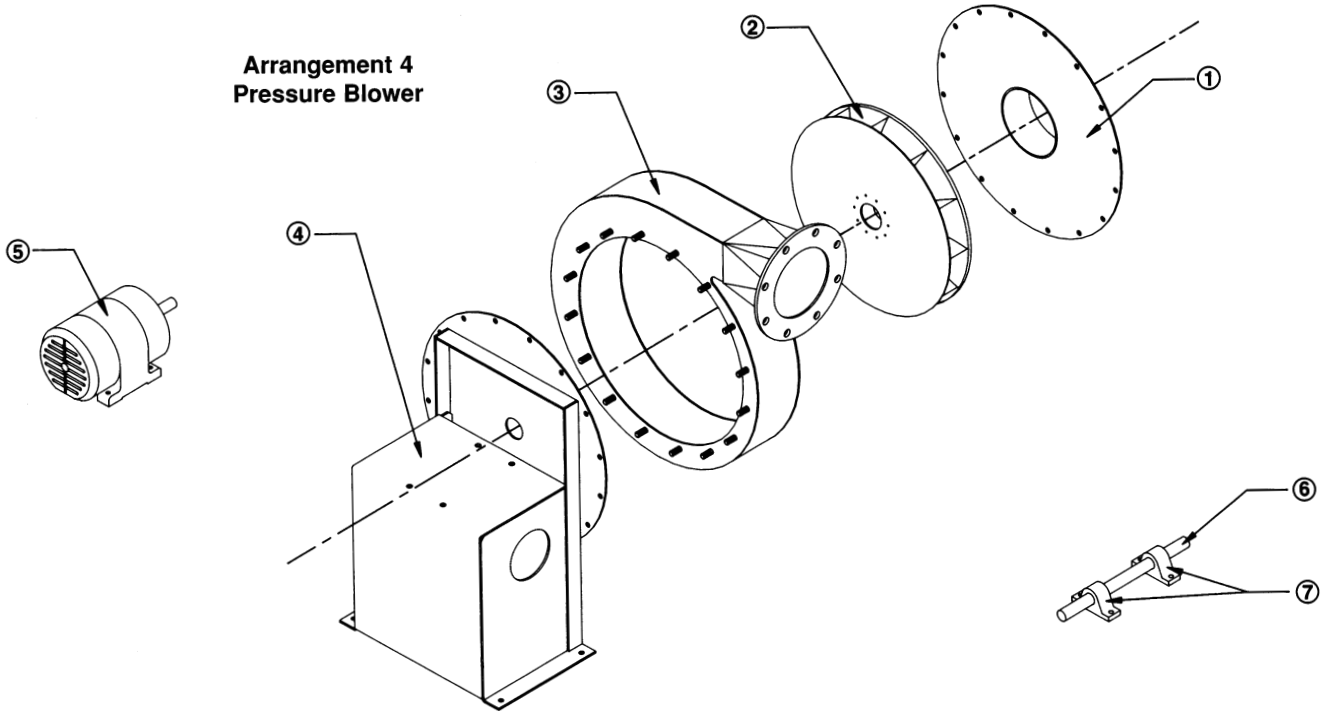
- For Arrangement 1/8 fan only.

SPECIFY ROTATION AS VIEWED FROM DRIVE SIDE

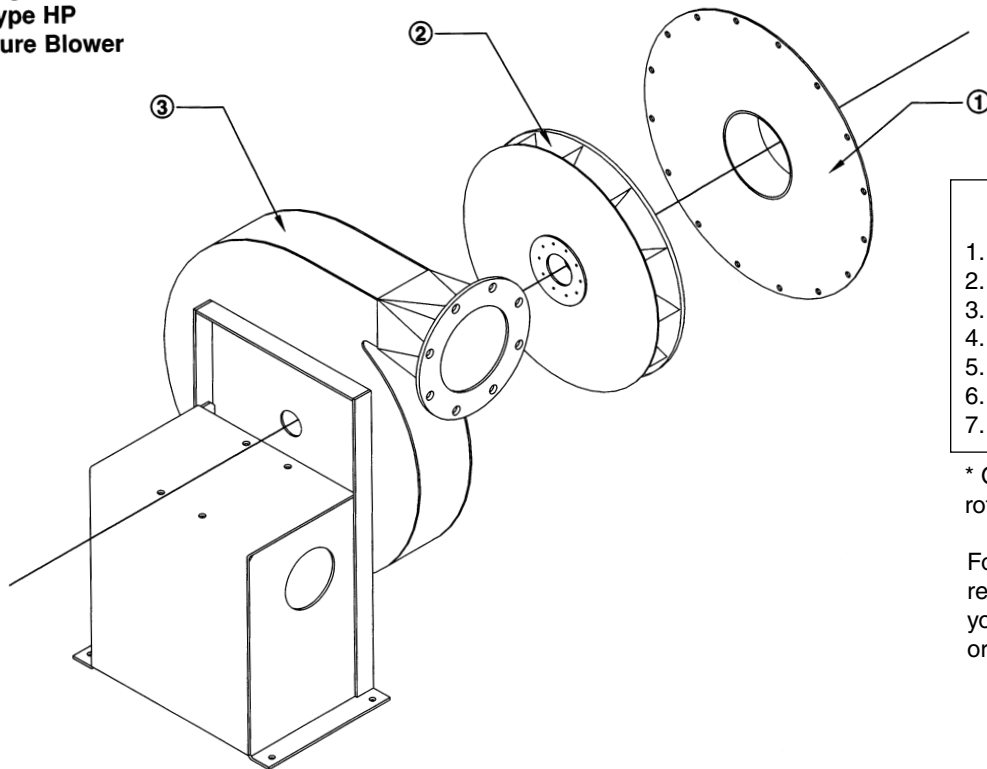


ARROW INDICATES COUNTER CLOCKWISE ROTATION

**Arrangement 4
Pressure Blower**



**Arrangement 4
Type HP
Pressure Blower**



Parts List

- 1. Inlet Plate Assembly
- 2. Wheel*
- 3. Housing*
- 4. Pedestal Assembly
- 5. Motor
- 6. Shaft
- 7. Bearings

* Order for parts must specify rotation.

For assistance in selecting replacement parts, contact your local **nyb** representative or visit: <http://www.nyb.com>.

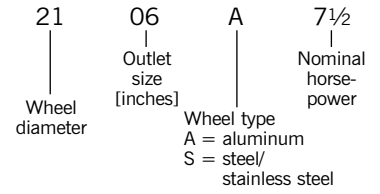
USING PERFORMANCE CURVES

Performance is shown according to outlet sizes for quick reference to duct diameter and velocity. Brake horsepower increments are identified on each curve. Recommended standard blower size and motor combinations are based on the most efficient area of operation and are indicated by the arrows. Nonstandard combinations are generally available, but are usually less efficient than the standard combinations.

SIZING NOMENCLATURE

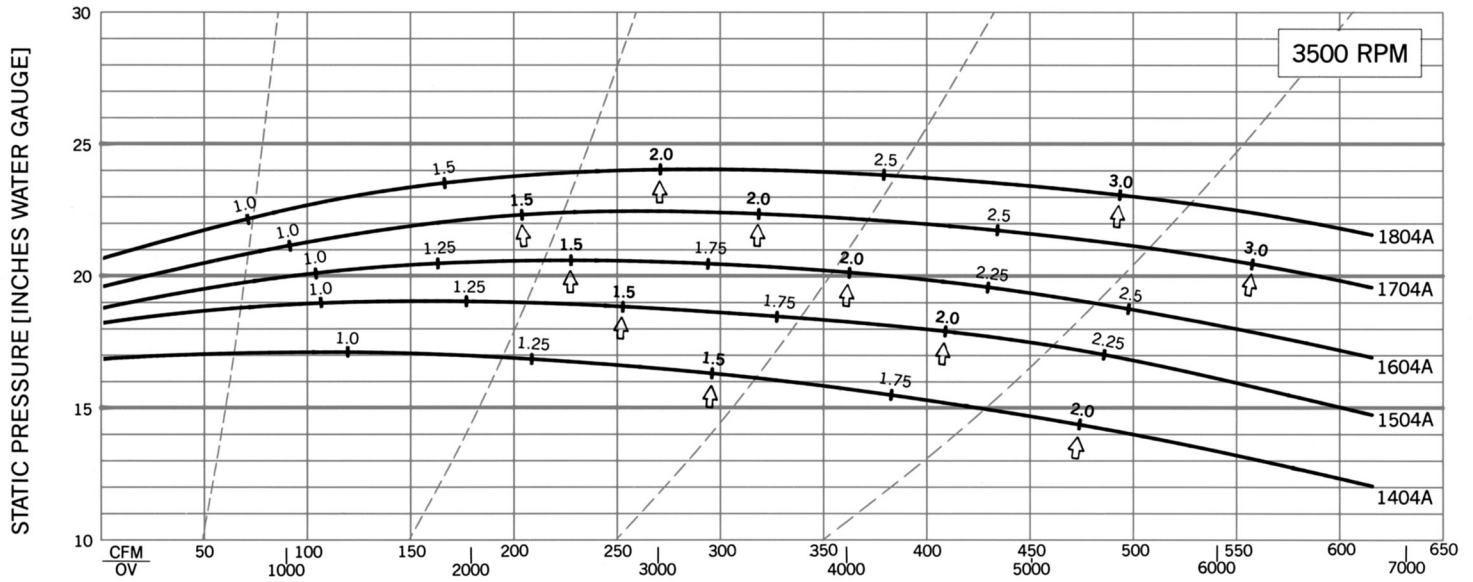
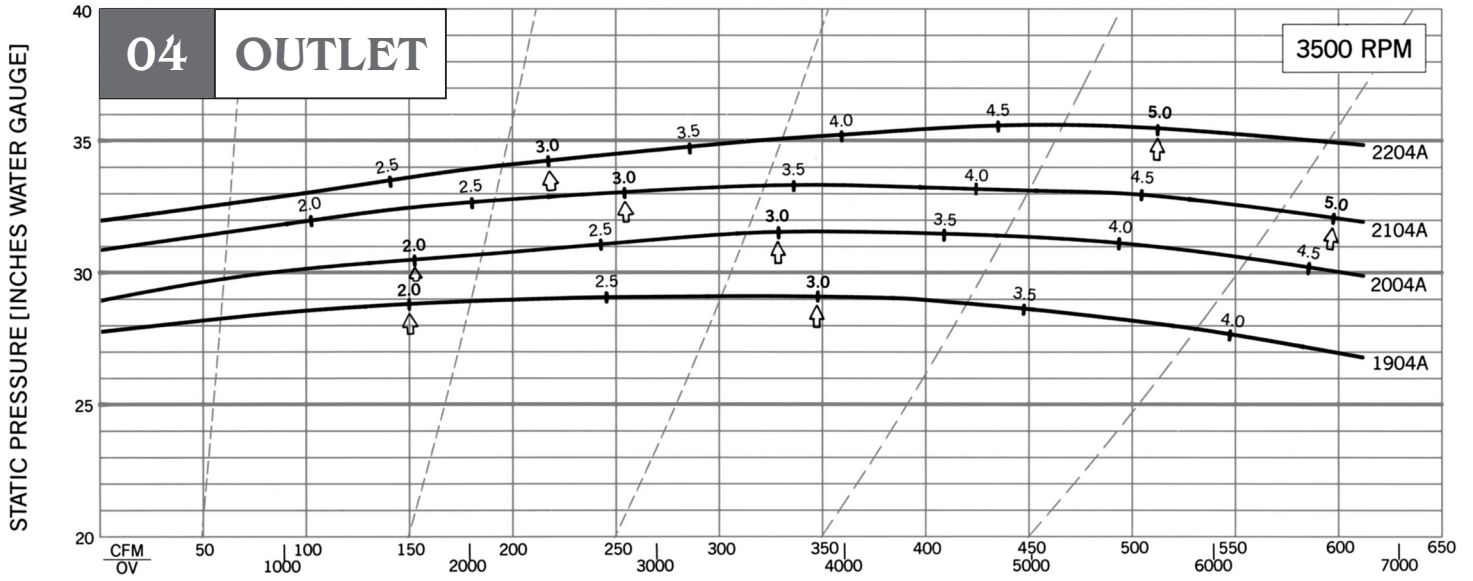
7-digit model number designates the wheel diameter, outlet size, wheel type, and nominal motor horsepower.
 Note: the last two digits showing motor horsepower are not required for Arrangement 1 Pressure Blowers.

EXAMPLE

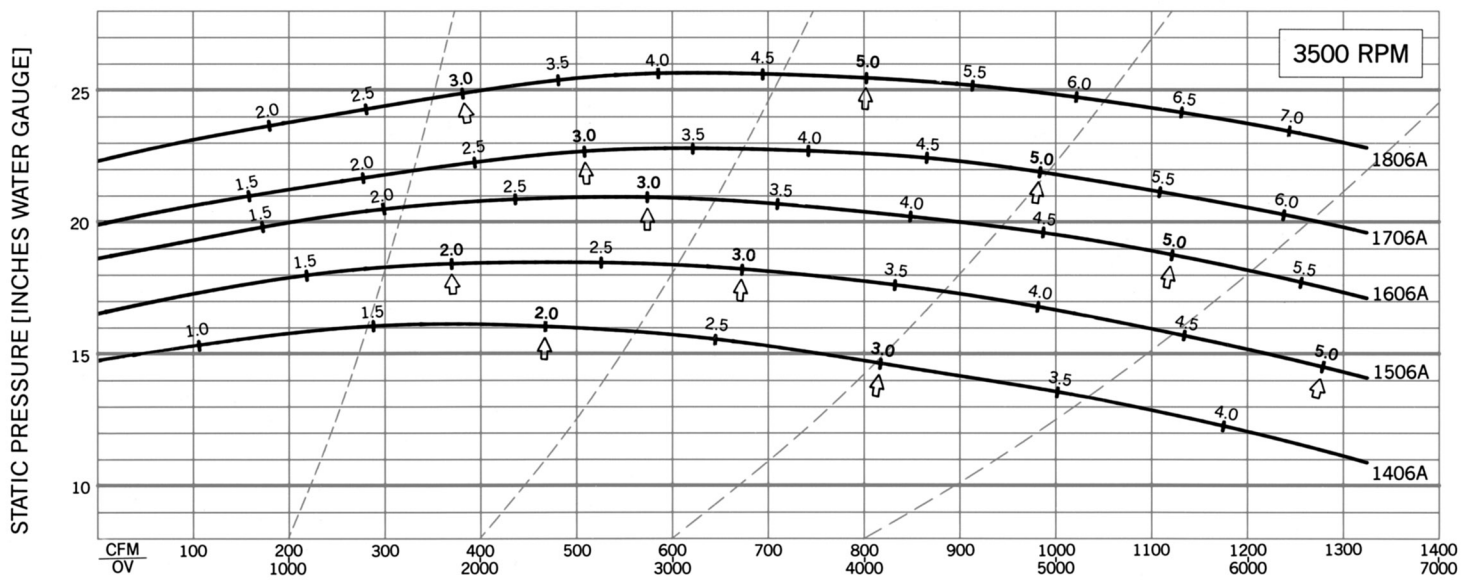
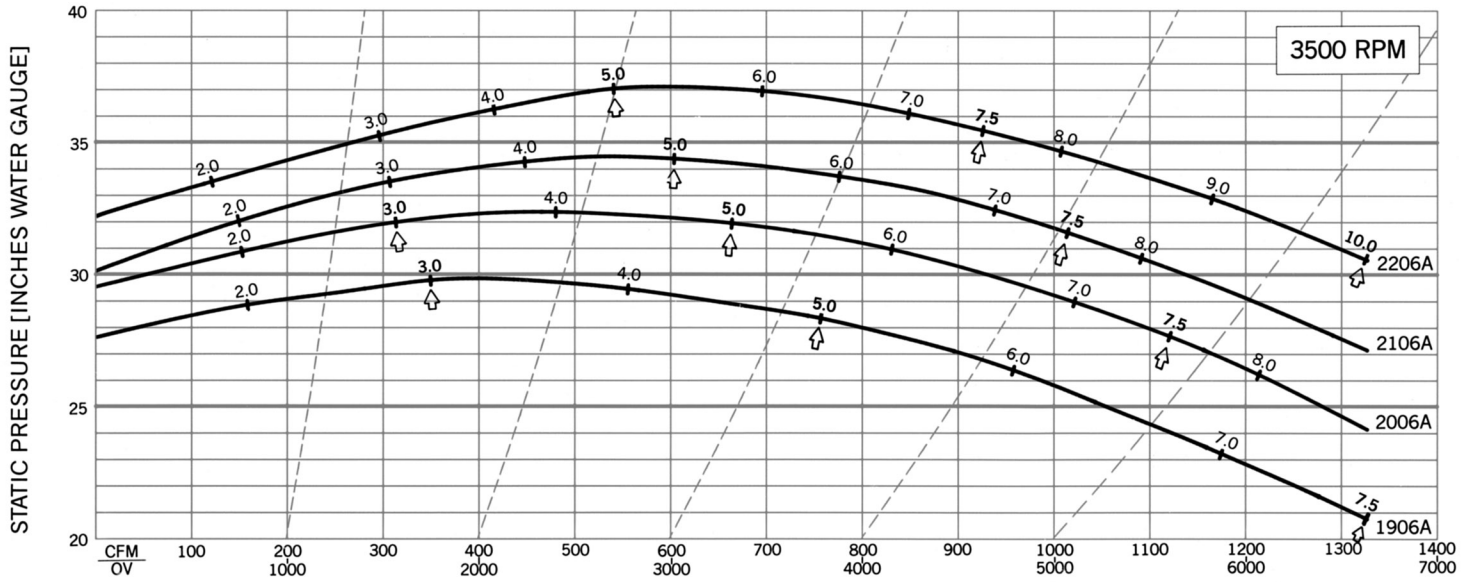
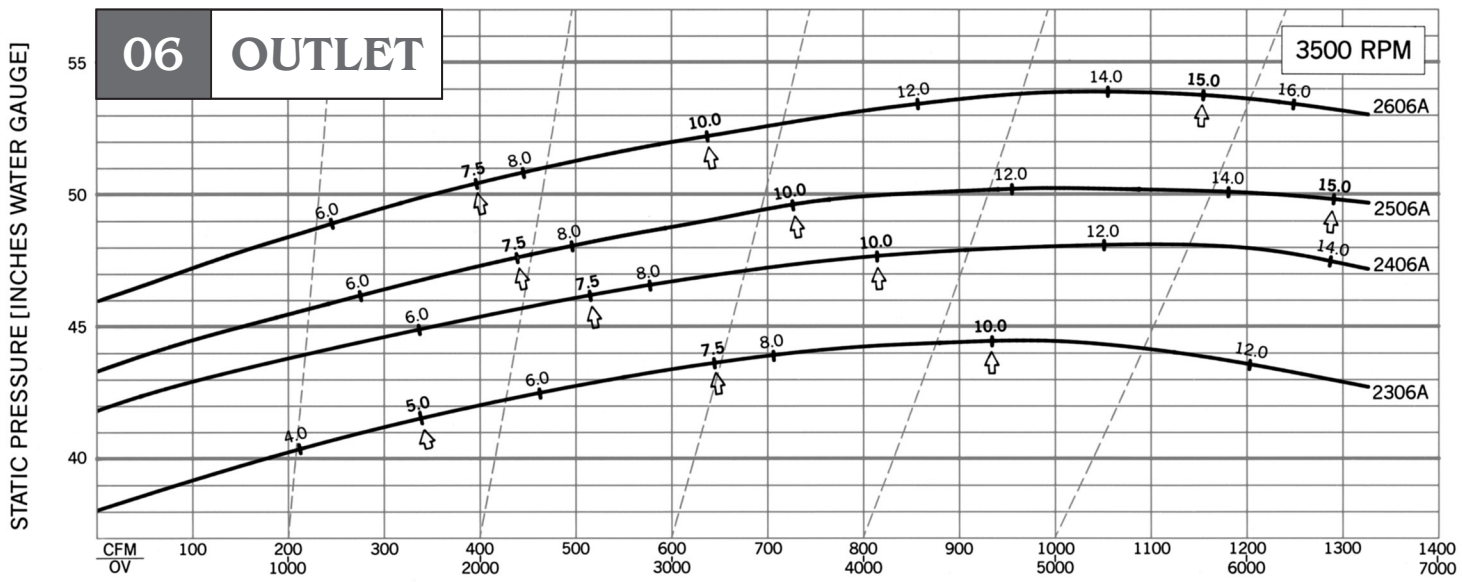


PROCEDURE	STEPS	EXAMPLE
Determine the appropriate outlet size.	1	The 06 outlet is selected for 800 CFM at 32"SP.
Plot the CFM and SP [standard] and follow a projected system line up to the pressure curve that meets or slightly exceeds the required performance.	2	A Size 2106A will provide 820 CFM at 33.6"SP.
Determine the BHP required for the point of operation . . . see page 4 for steel or stainless-steel wheel factors.	3	2106A requires 6.3 BHP. 2106S requires 7.2 BHP [6.3 x 1.15].
Read to the right to select motor horsepower.	4	A 7 1/2 HP motor will cover both wheel types.

Note: The horsepower coverage of a given motor will increase 15% when a 1.15 service factor motor is utilized.

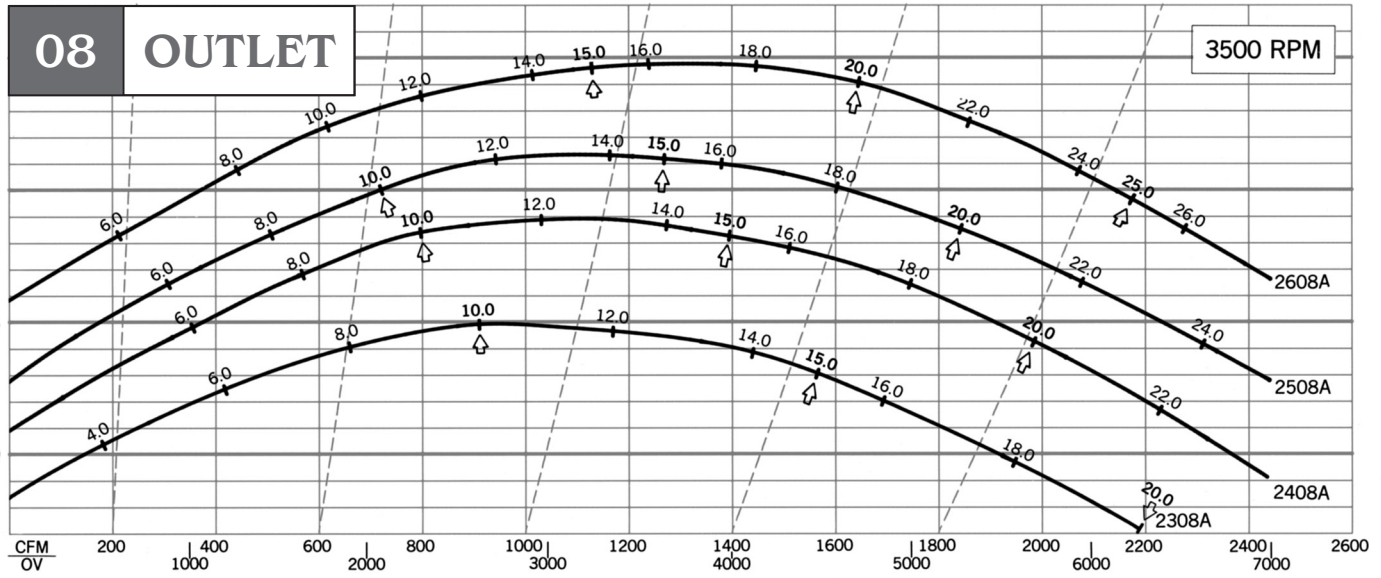


Performance shown is installation Type B: Free inlet, Ducted outlet. Power rating (BHP) does not include drive losses. Performance ratings do not include the effects of appurtenances in airstream.

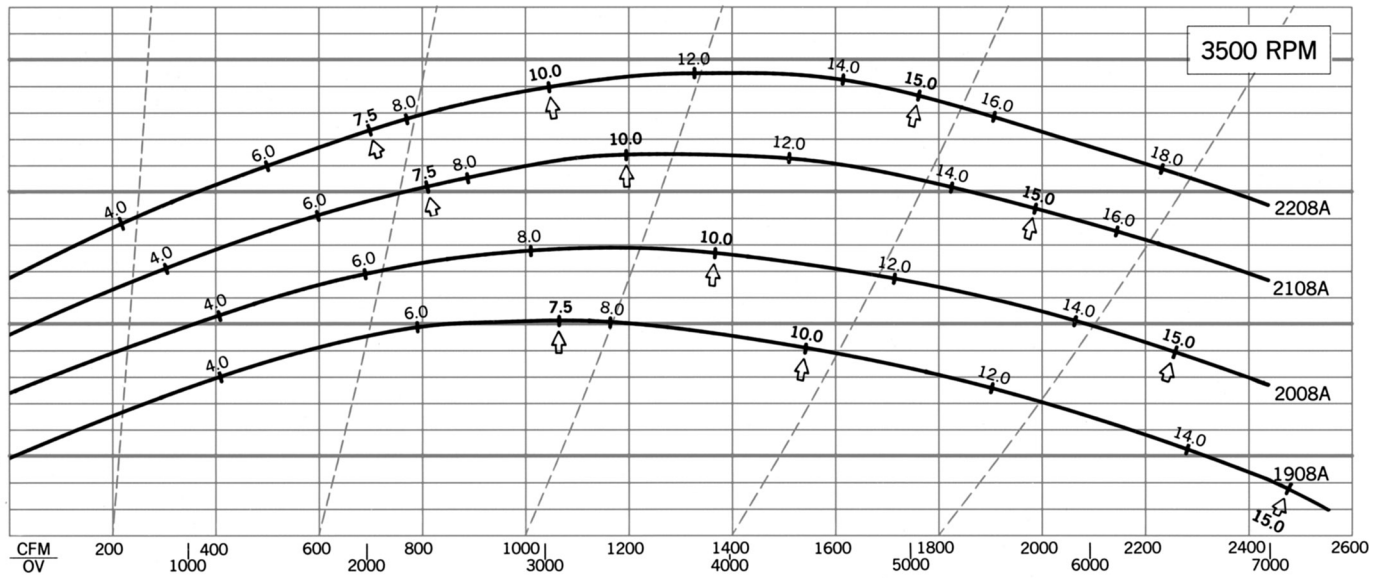


Performance shown is installation Type B: Free inlet, Ducted outlet. Power rating (BHP) does not include drive losses.
Performance ratings do not include the effects of appurtenances in airstream.

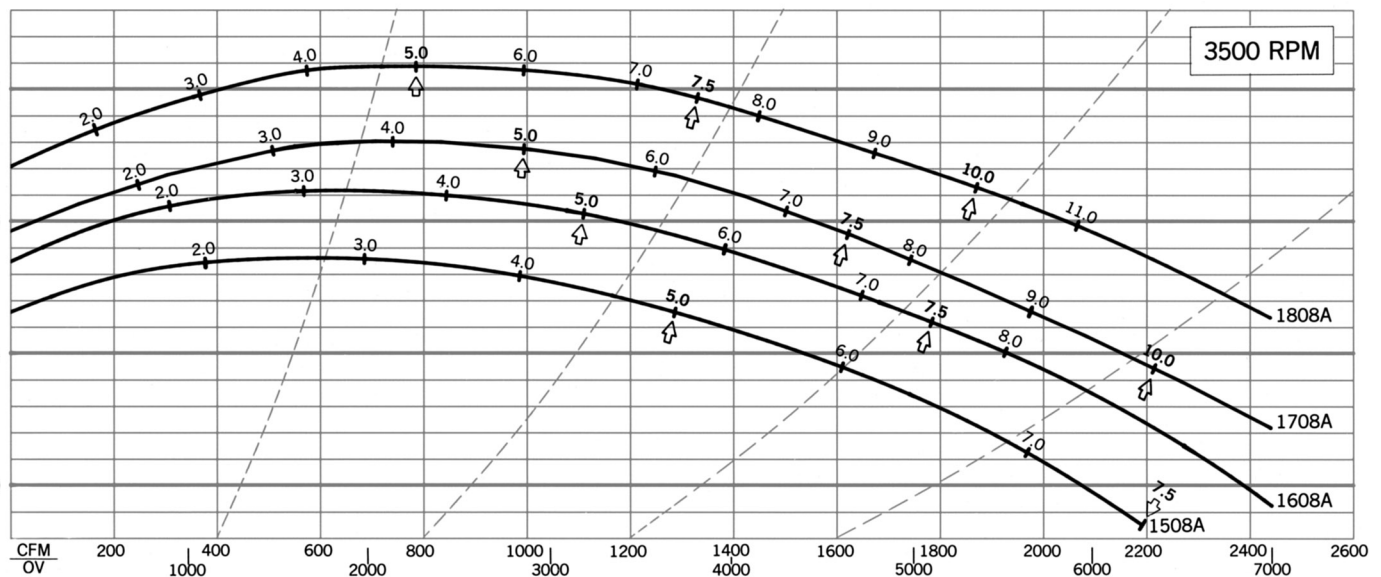
STATIC PRESSURE [INCHES WATER GAUGE]



STATIC PRESSURE [INCHES WATER GAUGE]



STATIC PRESSURE [INCHES WATER GAUGE]



Performance shown is installation Type B: Free inlet, Ducted outlet. Power rating (BHP) does not include drive losses.
Performance ratings do not include the effects of appurtenances in airstream.



Recommended SAFETY PRACTICES

for Users and Installers of Industrial and Commercial Fans
AMCA Publication 410-96

FOREWORD

i. This publication has been prepared by the Air Movement Division of the Air Movement and Control Association International, Inc. (AMCA International). The information contained in this publication has been derived from many sources. The suggestions made necessarily should be general in their meaning and cannot be applied literally to all specific situations or conditions.

ii. **The safe installation and operation of fans is the responsibility of the system designer, installer, maintainer, and user.** From the initial system design through the life of the equipment, safety should be a foremost consideration. Some areas which require some special attention include system design, layout and construction, fan performance specification, foundation and installation details, storage procedures, start-up and commissioning procedures, operation, maintenance, and repair. Specific safety requirements are mandated by federal, state, and local codes. *Recommended Safety Practices for Users and Installers of Industrial and Commercial Fans* is published by AMCA International for assistance. System designers, installers, maintainers, and users should consult and properly comply with all applicable codes and guidelines.

iii. The safety recommendations contained herein are intended to assist designers, installers, maintainers, or other users of air moving devices in the safe operation and use of the devices mentioned. These recommendations do not represent the only methods, procedures, or devices appropriate for the situations discussed. Caution should be used at all times when working in or around moving parts.

iv. AMCA International disclaims any and all warranties, expressed or implied, regarding the products sold by the manufacturer with which this booklet has been provided. Further, AMCA International recommends that competent personnel be consulted in deciding what is the preferred or recommended safety procedure in a particular instance where the guidelines contained in this booklet are unclear or in any way incomplete.

v. AMCA International has offered the information within this booklet to assist in the safe operation, maintenance, and use of the products sold by members of AMCA International. In so doing, AMCA International does not assume any legal duties of the designer or manufacturer to instruct or warn about their product. AMCA International expressly disclaims liability for any injury or damage arising out of the operation or use of the product or the guidelines contained herein.

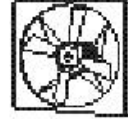
vi. These recommended safety practices were adopted by the AMCA International membership on April 28, 1996.



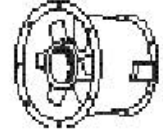
Power Roof Ventilator



Wall Exhauster



Propeller Fan



Axial Fan

1. INTRODUCTION

1.1 Fans and other air moving devices are made in a wide variety of types, sizes, and arrangements. This publication addresses the proper use and installation of industrial and commercial fans. It is not intended to address residential and consumer fans.



Centrifugal Fan



Upblast Roof Exhauster

1.2 Various "size" factors are important when assessing potential for injury; some factors are: diameter of impeller (wheel, rotor, propeller), rotational inertia, voltage, and current.

1.3 This guide is intended to assist in the safe installation of air moving equipment and to warn operating and maintenance personnel of the commonly recognized hazards associated with this equipment.

1.4 Handling and installation should always be performed only by experienced and trained personnel who are aware of the hazards associated with rotating equipment. Failure to comply with these practices may result in death or serious bodily injury. In addition to following the manufacturer's installation instructions, care should be taken to ensure compliance with specific safety requirements mandated by federal, state, and local codes. Industry safety standards and practices published by AMCA International and by other recognized agencies and associations should be consulted and followed where applicable.

2. PERSONNEL SAFETY ACCESSORIES

2.1 GENERAL

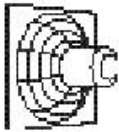
2.1.1 Protective devices are incorporated as standard construction on some types of fans but on many fans, these devices are offered as optional accessories. This is done because the need for the devices and the design required will frequently depend upon the type of system, fan location, and operating procedures being employed. Proper protective safety devices; company safety standards; specific safety requirements mandated by federal, state, and local codes; and industry safety standards and practices published by AMCA International and by other recognized agencies and associations should be determined by the user, who should specify and obtain the appropriate devices from the fan manufacturer or others, and should not allow operation of the equipment without them. Examples of available devices include the following:

2.2 FAN GUARDS

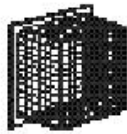
2.2.1 All fans have moving parts which require guarding in the same way as other moving machinery. Fans located less than seven (7) feet above the floor require special consideration. Specific safety requirements should comply with mandated federal, state, and local codes; and industry safety standards and practices published by AMCA International and by other recognized agencies and associations should be followed.

2.2.2 Roof-mounted fans and other fans which are not generally accessible may not require safety guards which might otherwise be appropriate. Where accessibility to these fans is occasional or infrequent, the expense of permanent guarding may be reduced through the use of lockout switches and suitable warnings. In such cases, maintenance personnel

should engage the lockout switch before undertaking any maintenance or repairs. As is the case with other machinery involving moving parts, common sense and caution will preserve personal safety.



*Industrial Type Guard
For Propeller Fan*



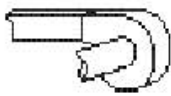
*Maximum Safety
Guard for Propeller Fan*



*Screen on Roof
Ventilator*

2.3 INLET AND OUTLET GUARDS

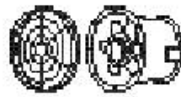
2.3.1 Axial and centrifugal fans are often connected directly to ductwork which will prevent contact with the internal moving parts; when an exposed inlet or outlet represents a hazard, a suitable guard should be installed.



*Centrifugal Fan
Protected by Ductwork*



*Inlet or Outlet Guard
on Centrifugal Fan*



*Guard for Axial Fan With
Non-Ducted Inlet or Outleg*

2.4 DRIVE GUARDS

2.4.1 Fans may be driven directly from the motor shaft or through a belt drive. Where the bearing assembly, rotating shaft, sheaves, or belts are exposed, a suitable guard may need to be provided. Some example guards are shown below.



*Drive Coupling
Guard*



*Heat Slinger Guard
(Shaft and bearing
guard omitted for clarity)*



*Shaft and Bearing
Guard*

2.4.2 Drive guards may be required for tubular centrifugal or axial fans to cover the exposed drive sheave and belts outside the fan housing.



Drive Guard - Axial Fan

2.4.3 A typical centrifugal fan drive guard may vary with the arrangement. Safety guards should be used when drive systems are accessible to personnel. In restricted areas, omission of the back cover may be acceptable.



*Drive Guard -
Centrifugal Fan*

2.4.4 Dampers and their linkage may operate suddenly without warning at high speeds. Dampers and their linkage contain pinch points which should be identified and guarded.

3. HIDDEN DANGERS

3.1 GENERAL

3.1.1 In addition to the obvious hazards associated with the moving parts of rotating machinery, fans present additional potential hazards that are not so obvious and should be considered by the system designer and user for safe operation.

3.2 SUCTION AND AIR PRESSURE

3.2.1 Fans operate by creating suction and air pressure which can be hazardous. Solid objects can be drawn into a fan's inlet and then become dangerous projectiles when they are exhausted through the fan's outlet. **Solid objects can also**



*Special Purpose
Intake Screen*

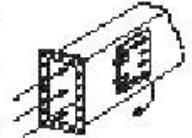
cause fan failure or impeller failure due to imbalance or damage to the impeller blades. Personnel in close proximity to a fan inlet can be overcome by the suction, and drawn into the fan.

3.2.2 Whenever there is a possibility that solid objects can be drawn into a remote intake, the intake should be guarded at all times. Before a guard is removed, the fan should be disconnected and the power supply locked out.

3.2.3 Where fans are installed over an occupied area, safety guards should be provided to prevent dropped objects from entering this area during installation and maintenance.

3.2.4 Access doors to a fan or duct system should never be opened while the fan is operating or coasting to a stop. On the downstream (or pressure) side of the system, releasing the door with the system in operation may result in an explosive opening. On the upstream (or suction) side, the inflow may be sufficient to draw in tools, clothing, and other materials. The power supply should always be locked out prior to accessing a fan or ductwork.

3.2.5 Fan design sometimes requires access doors to be supplied with internal components such as a plug to fill a hole in the fan casing. These doors can often be heavy and difficult to handle. Care should be exercised when opening, removing, and installing these components.



*Bolted Access Door in
Duct*

3.3 WINDMILLING

3.3.1 Even when the power supply is locked out, fans may cause injury or damage if the impeller is subject to "windmilling" which is the turning of the impeller and drive components due to a draft in the system. To guard against this hazard, the impeller should be secured to physically restrict rotational movement.

3.4 TEMPERATURE

3.4.1 Many fans, fan motors, and fan components run at temperatures that could burn someone who comes in contact with the hot areas, including discharged or leaking gases. If this potential hazard is present, steps should be taken so that personnel working near the fan are aware of the danger and can exercise caution.

3.5 FAN NOISE AND ENVIRONMENT

3.5.1 Some fans can generate sound that could be hazardous to exposed personnel. Sound pressure can be measured in the field, but obtaining accurate data is difficult. The environment in which the fan operates can impact the ability to obtain accurate fan sound readings. Consult the manufacturer for fan sound data. It is the responsibility of the system designer, installer, user, and maintainer to comply with specific safety requirements mandated by federal, state, and local codes; and to follow industry safety standards and practices published by AMCA International and by other recognized agencies and associations, regarding personnel safety from exposure to fan noise associated with use and exposure to equipment.



Hearing Protection

3.6 STROBOSCOPIC EFFECT

3.6.1 The stroboscopic effect of certain lights in combination with certain fan speeds may cause a rotating assembly to appear stopped. In these cases, irregular markings can be placed on the moving parts to prevent this type of effect. Personnel should be warned that the fan may be in motion even if it appears not to be.

3.7 SPECIAL PURPOSE FANS AND SYSTEMS

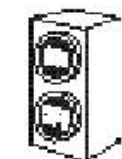
3.7.1 The hidden dangers associated with Special Purpose Fans used in special systems are covered in Section 6.

4. POWER ISOLATION

4.1 Every fan should be installed with a suitable device allowing it to be completely disconnected or isolated from the power supply.

4.2 Many fans are started by remote switches or push-buttons, by interlocks with other equipment, or by automatic controls. Before performing any maintenance, inspection, or other activity which will require removal of guards, ductwork, access doors, etc., or exposure of moving parts, the fan power supply should be locked out and the fan tagged out of service.

4.3 In some installations other equipment, such as gas burners, may be interlocked with the fan so that disconnecting the fan will automatically shut off the burner or other device. Maintenance on systems of this type should be performed only under the supervision of competent engineering personnel and in accordance with applicable codes and standards.



Remote Switch



Disconnect Switch



Lock Carried by
Maintenance Personnel

4.4 In cases where the fan is power driven by a source other than an electric motor, appropriate provisions should be made for the isolation or disengagement of the power supply.

5. START-UP CHECK LIST

5.1 GENERAL

5.1.1 Before putting any fan into initial operation, the manufacturer's instructions should be followed. Transportation, handling, and installation can cause fasteners to loosen, and cause misalignment of fan components. Carefully follow this check list when commissioning equipment.

5.1.2 Lock out the primary and all secondary power sources.

5.1.3 A complete inspection should be made of all of the ductwork and the interior of the fan. Make certain there is no foreign material which can be drawn into or blown through the fan or ductwork. Appropriate protective measures and safety practices should be observed when entering or working within these areas. These measures might include the use of goggles, respirators, or other personal protective devices.

5.1.4 Make sure the foundation or mounting arrangement and the duct connections are adequately designed and installed per drawings and in accordance with recognized acceptable engineering practices and with the fan manufacturer's recommendations.

5.1.5 Check and tighten all bolts, fasteners, and set screws as necessary.

5.1.6 Check the fan assembly and bearings for proper grounding to prevent static electricity discharge.

5.1.7 Ensure power and drive components such as motor starter, variable frequency drive, or hydraulic power unit are properly sized, matched, and connected to the fan.

5.1.8 Check bearings for recommended lubricant and lubrication amount.

5.1.9 Spin the rotating assembly to determine whether it rotates freely, without hitting anything, and is not grossly out of balance.

5.1.10 Inspect impeller for proper rotation for the fan design.

5.1.11 Check alignment of drives and all other components.

5.1.12 Check the belt drive for proper sheave selection and installation and make sure the sheaves are not reversed (excessive speeds could develop).

5.1.13 Check for recommended belt tension.

5.1.14 Properly secure all safety guards.

5.1.15 Assure that all appropriate warnings have been put in place.

5.1.16 Secure all access doors to the fan and ductwork.

5.1.17 Momentarily energize the fan to check the direction of rotation. Listen as the fan coasts to a stop for any unusual noise, identify the source, and take corrective action as necessary.

5.1.18 Switch on the electrical supply and allow the fan to reach full speed. Check carefully for:

- (1) Excessive vibration
- (2) Unusual noise
- (3) Proper belt alignment
- (4) Proper lubrication
- (5) Proper amperage, voltage, or power values.
- (6) If any problem is indicated, **SWITCH OFF IMMEDIATELY.**
- (7) Lock out the power supply. Secure the fan impeller if there is a potential for windmilling. Check carefully for the cause of the trouble, correct as necessary, and repeat check list procedure.

5.2 Even if the fan appears to be operating satisfactorily, shut down after a brief period, lock out the power supply, and recheck items 5.1.5 through

5.1.17 as the initial start-up may have loosened the bolts, fasteners, and set screws.

5.3 The fan may now be put into operation, but during the first eight hours of running, it should be closely observed and checked for excessive vibration and noise. At this time checks should also be made of motor input current and motor and bearing temperatures to ensure that they do not exceed manufacturer's recommendations.

5.4 After eight hours of operation, the fan should be shut down and the power locked out. Check list items 5.1.5 through 5.1.17 should be inspected and adjusted if necessary.

5.5 After twenty-four (24) hours of satisfactory operation, the fan should be shut down (locked out) and the drive belt tension should be readjusted to recommended tension.

5.6 After commissioning and start-up, the fan should be operated and maintained in accordance with the manufacturer's and component manufacturer's recommendations. Some basic guidelines for **WARNING SIGNS** and **ROUTINE MAINTENANCE** are included in Sections 7 and 8 of this publication. These sections are meant as a supplement to other publications and are not intended to replace the manufacturer's instructions.

6. SPECIAL PURPOSE FANS

6.1 Most fans are designed to handle clean air at standard temperatures between 32 F and 120 F. These fans should not be placed in systems or used for other than their design intended use. *Special Purpose Fans* are designed for use in systems that may include extreme temperatures, explosive, toxic, or special gases, material handling, corrosive environments, or other special hazards which should be carefully considered. Specific safety requirements should comply with mandated federal, state, and local codes; and industry safety standards and practices published by AMCA International and by other recognized agencies and associations should be followed.

6.2 Where the system will handle explosive or flammable material (i.e., dust, fumes, vapors or gases), fans of spark-resistant construction should be used.

6.3 Fans connected by ductwork or other piping may contain gases other than air which are hazardous. In these cases, procedures should be established to prevent exposure of personnel working on or near the fan, and by maintenance personnel who may need to enter the fan.

Appropriate personal protective equipment as determined by the material safety data sheet, and system operators should be utilized. Appropriate environmental protective measures should also be taken.

6.4 Fan inlet boxes, housings, ductwork, and other system components which are large enough to permit entry should be considered confined spaces. System areas may also serve as low points where heavy gases, liquids, or other substances may accumulate and present explosive, fire, health, or suffocation hazards. Appropriate protective measures and safety practices should be observed when entering or working within these areas.

6.5 Material-handling fans are specially designed to allow the fan to handle a specific type of material without excessive

accumulation of material on the fan impeller. Fans handling corrosive gases or erosive material should be checked periodically. If loss of material is evident, the fan should be shut down, power supply locked out, and tagged out of service. The manufacturer or other qualified personnel should be consulted to determine if the fan is within safety limits for operation. To ensure satisfactory operation it is essential to observe the manufacturer's limitations concerning the type of material to be handled by the fan.

6.6 Fan ratings and maximum speed limits are typically based on the use of air at 70 F. At temperatures above the normal range (specified by the manufacturer), a reduction should be made in the maximum speed limit. Information on this reduction and on other precautions to be taken for high temperature applications should be obtained from the fan manufacturer. Personnel working near high temperature fans should be aware that coming in contact with the fan's housing, ductwork, or handled gases could result in serious burns. Where the danger of burns is not apparent, appropriate warnings should be posted. Appropriate protective apparel should be worn whenever working in close contact with heated housings or ductwork.

6.7 Corrosive contaminants can be formed when moisture combines with an active airborne chemical. Fans subjected to corrosive contaminants will corrode; however, suitable protective coatings or material, if used in



the fan construction, can delay corrosion. Protected fans should be regularly inspected to ensure that the protection remains effective. Personnel working in environments with airborne chemicals may require personal protective apparel equipment.

6.8 Where liquid can accumulate within the fan, provide for the installation of adequately sized drains.

6.9 In those applications where there is a potential for chemical build-up (such as grease, creosote, etc.), periodic cleaning and proper drainage are necessary to avoid a fire hazard.

7. WARNING SIGNS

7.1 GENERAL

7.1.1 A change in the operating characteristics of a fan may indicate the need for maintenance. Sudden changes may indicate severe problems or dangerous conditions developing. Investigate any changes in the operational characteristics or unusual symptoms of the fan. Refer to AMCA Publication 202, *Troubleshooting*, for a more detailed explanation of investigating procedures. Consult your manufacturer or other qualified consultant with questions concerning changes observed.

7.2 EXCESSIVE VIBRATION

7.2.1 Operational vibration levels are one of the best indicators of the condition of the blower. Careful observation and monitoring of vibration levels can detect a minor problem in the early stages of development when correction is less costly and easier. Recommended maximum vibration levels should be obtained from the equipment manufacturer.

7.2.2 If excessive vibration is observed, stop the fan and lock it out until the cause is corrected. Check for material build-up on the impeller. Generally this will show up as material flaking off the fan impeller and causing an imbalance which may lead to catastrophic failure of the fan or its components. Excessive vibration can also be caused by looseness in the drive train, loose fasteners, misalignment or impeller damage. Contact the fan manufacturer or other qualified consultant to determine the maximum vibration level if it is not included in maintenance instructions.

7.3 NOISE

7.3.1 Changes to the sound level may indicate maintenance is needed. Some unusual noises often heard include: bearing noise indicating the bearings need lubricant or replacement; scraping or ticking noise indicating the rotating parts are hitting the stationary parts; squealing indicating the belt drive needs tensioning; repeated changing pitch of the blower indicating operation of the blower at too low a flow. If any of these noises or any other unusual noises are detected, their cause should be determined and corrective action taken as necessary.

7.4 HIGH MOTOR TEMPERATURES

7.4.1 Check that cooling air to the motor has not been diverted or blocked by dirty guards or similar obstacles. Check the input amperage. An increase in amperage may indicate that some major change has occurred in the system.

7.5 HIGH BEARING TEMPERATURES

7.5.1 This condition is usually caused by improper lubrication; this can be either "over," "under," or "unsuitable" lubrication. In every case, if the cause of the trouble is not easily seen, experienced personnel should examine the equipment before it is put back in operation.

7.6 POOR PERFORMANCE

7.6.1 Too much flow or pressure or too little flow or pressure is often a symptom of a change in the operating system. A fan will typically operate at the same performance in a static system some typical causes include: operating of the fan backwards after maintenance procedures; filters dirty or not in place; change or blockage in the ductwork; change in speed of the fan (switching the sheaves); loss or failure of the impeller. All of these causes and many others will affect the flow and pressure produced by the fan.

8. ROUTINE MAINTENANCE

8.1 A preventive maintenance program is an important aspect of an effective safety program. Consult your manufacturer or other qualified consultant with questions concerning changes observed during periodic inspections and routine maintenance.

8.2 The fan manufacturer's operating and maintenance recommendations, as well as the components manufacturer's instructions (such as motor, bearing, drives, etc.) should be strictly followed.

8.3 *Maintenance should always be performed by experienced and trained personnel who are aware of the hazards associated with rotating equipment.* Do not attempt any maintenance on a fan unless the fan power supply has been locked out and tagged out and the impeller has been secured.

8.4 When performing maintenance functions which include disassembly of the fan, careful consideration should be given to the size, weight, center of gravity, and lifting means of the fan components. It should also be noted that the outboard bearing on some fans such as arrangements 1, 8, 9, and 10 is often cap-loaded. Removal of the securing means may result in a sudden change in impeller position.

8.5 Historical data is often the best indicator for determining the operational condition of the fan. Maintenance logs which include relubrication, vibration levels, temperature levels, power requirements, inspection, and other pertinent records should be maintained and consulted as necessary when assessing the condition of the fan.

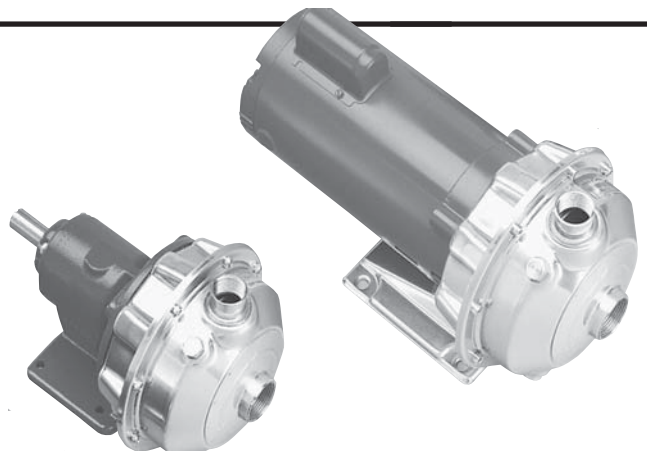
8.6 Under normal circumstances, handling clean air, the system should require cleaning only once a year. However, the fan and system should be checked at regular intervals to detect any unusual accumulation.

8.7 The fan impeller should be specially checked for build-up of material or dirt which may cause an imbalance with resulting undue wear on bearings and belt drives. A regular maintenance program should be established as needed to prevent material build-up.

8.8 Periodic inspection of the rotating assembly should be made to detect any indication of weakening of the rotor because of corrosion, erosion, or metal fatigue. Where signs of deterioration are found, lock out and tag out the impeller until the unit has been inspected and approved by a qualified consultant.

Installation, Operation and Maintenance Instructions

Model NPE/ NPE-F



DESCRIPTION & SPECIFICATIONS:

The Models NPE (close-coupled) and NPE-F (frame-mounted) are end suction, single stage centrifugal pumps for general liquid transfer service, booster applications, etc. Liquid-end construction is all AISI Type 316 stainless steel, stamped and welded. Impellers are fully enclosed, non-trimable to intermediate diameters. Casings are fitted with a diffuser for efficiency and for negligible radial shaft loading.

Close-coupled units have NEMA 48J or 56J motors with C-face mounting and threaded shaft extension. Frame-mounted units can be coupled to motors through a spacer coupling, or belt driven.

1. Important:

1.1. Inspect unit for damage. Report any damage to carrier/dealer immediately.

1.2. Electrical supply must be a separate branch circuit with fuses or circuit breakers, wire sizes, etc., per National and Local electrical codes. Install an all-leg disconnect switch near pump.

CAUTION

Always disconnect electrical power when handling pump or controls.

1.3. Motors must be wired for proper voltage. Motor wiring diagram is on motor nameplate. Wire size must limit maximum voltage drop to 10% of nameplate voltage at motor terminals, or motor life and pump performance will be lowered.

1.4. Always use horsepower-rated switches, contactor and starters.

1.5. Motor Protection

1.5.1. Single-phase: Thermal protection for single-phase units is sometimes built in (check nameplate). If no built-in protection is provided, use a contactor with a proper overload. Fusing is permissible.

1.5.2. Three-phase: Provide three-leg protection with properly sized magnetic starter and thermal overloads.

1.6. Maximum Operating Limits:

Liquid Temperature: 212° F (100° C) with standard seal.
250° F (120° C) with optional high temp seal.

Pressure: 75 PSI.

Starts Per Hour: 20, evenly distributed.

1.7. Regular inspection and maintenance will increase service life. Base schedule on operating time. Refer to Section 8.

2. Installation:

2.1. General

2.1.1. Locate pump as near liquid source as possible (below level of liquid for automatic operation).

2.1.2. Protect from freezing or flooding.

2.1.3. Allow adequate space for servicing and ventilation.

2.1.4. All piping must be supported independently of the pump, and must “line-up” naturally.

CAUTION

Never draw piping into place by forcing the pump suction and discharge connections.

2.1.5. Avoid unnecessary fittings. Select sizes to keep friction losses to a minimum.

2.2. Close-Coupled Units:

2.2.1. Units may be installed horizontally, inclined or vertically.

CAUTION

Do not install with motor below pump. Any leakage or condensation will affect the motor.

2.2.2. Foundation must be flat and substantial to eliminate strain when tightening bolts. Use rubber mounts to minimize noise and vibration.

2.2.3. Tighten motor hold-down bolts before connecting piping to pump.

2.3. Frame-Mounted Units:

2.3.1. It is recommended that the bedplate be grouted to a foundation with solid footing. Refer to Fig. 1.

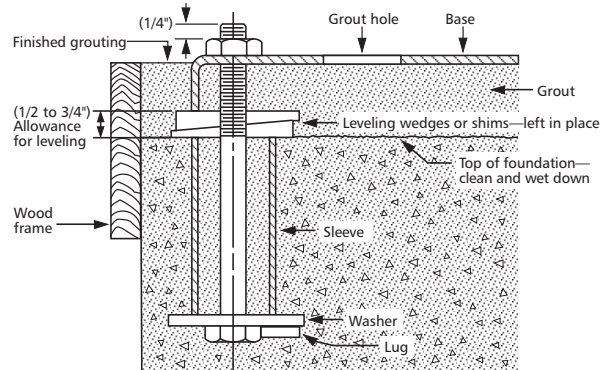


Figure 1

2.3.2. Place unit in position on wedges located at four points (two below approximate center of driver and two below approximate center of pump). Adjust wedges to level unit. Level or plumb suction and discharge flanges.

2.3.3. Make sure bedplate is not distorted and final coupling alignment can be made within the limits of movement of motor and by shimming, if necessary.

2.3.4. Tighten foundation bolts finger tight and build dam around foundation. Pour grout under bedplate making sure the areas under pump and motor feet are filled solid. Allow grout to harden 48 hours before fully tightening foundation bolts.

2.3.5. Tighten pump and motor hold-down bolts before connecting the piping to pump.

3. Suction Piping:

3.1. Low static suction lift and short, direct, suction piping is desired. For suction lift over 10 feet and liquid temperatures over 120 F, consult pump performance curve for Net Positive Suction Head Required.

3.2. Suction pipe must be at least as large as the suction connection of the pump. Smaller size will degrade performance.

3.3. If larger pipe is required, an eccentric pipe reducer (with straight side up) must be installed at the pump.

3.4. Installation with pump below source of supply:

3.4.1. Install full flow isolation valve in piping for inspection and maintenance.

CAUTION

Do not use suction isolation valve to throttle pump.

3.5. Installation with pump above source of supply:

3.5.1. Avoid air pockets. No part of piping should be higher than pump suction connection. Slope piping upward from liquid source.

3.5.2. All joints must be airtight.

3.5.3. Foot valve to be used only if necessary for priming, or to hold prime on intermittent service.

3.5.4. Suction strainer open area must be at least triple the pipe area.

3.6. Size of inlet from liquid source, and minimum submergence over inlet, must be sufficient to prevent air entering pump through vortexing. See Figs. 2-5

3.7. Use 3-4 wraps of Teflon tape to seal threaded connections.

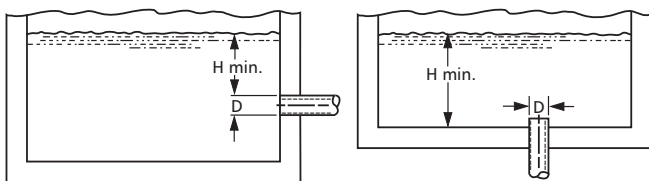


Figure 2

Figure 3

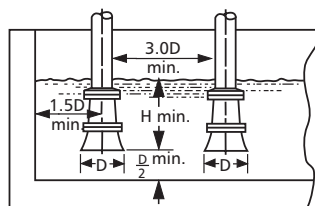


Figure 4

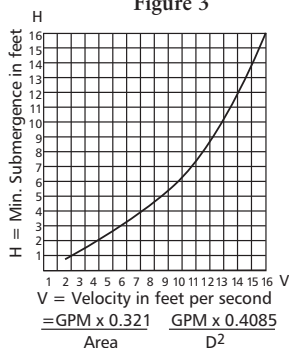


Figure 5

4. Discharge Piping:

4.1. Arrangement must include a check valve located between a gate valve and the pump. The gate valve is for regulation of capacity, or for inspection of the pump or check valve.

4.2. If an increaser is required, place between check valve and pump.

4.3. Use 3-4 wraps of Teflon tape to seal threaded connections.

5. Motor-To-Pump Shaft Alignment:

5.1. Close-Coupled Units:

5.1.1. No field alignment necessary.

5.2. Frame-Mounted Units:

5.2.1. Even though the pump-motor unit may have a factory alignment, this could be disturbed in transit and must be checked prior to running. See Fig. 6.

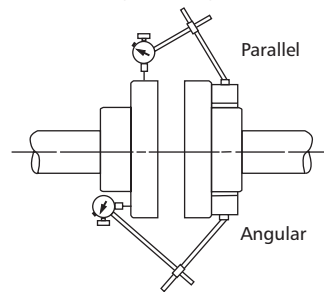


Figure 6

5.2.2. Tighten all hold-down bolts before checking the alignment.

5.2.3. If re-alignment is necessary, always move the motor. Shim as required.

5.2.4. Parallel misalignment - shafts with axis parallel but not concentric. Place dial indicator on one hub and rotate this hub 360 degrees while taking readings on the outside diameter of the other hub. Parallel alignment occurs when Total Indicator Reading is .005", or less.

5.2.5. Angular misalignment - shafts with axis concentric but not parallel. Place dial indicator on one hub and rotate this hub 360 degrees while taking readings on the face of the other hub. Angular alignment is achieved when Total Indicator Reading is .005", or less.

5.2.6. Final alignment is achieved when parallel and angular requirements are satisfied with motor hold-down bolts tight.

CAUTION

Always recheck both alignments after making any adjustment.

6. Rotation:

6.1. Correct rotation is right-hand (clockwise when viewed from the motor end). Switch power on and off quickly. Observe shaft rotation. To change rotation:

6.1.1. Single-phase motor: Non-reversible.

6.1.2. Three-phase motor: Interchange any two power supply leads.

7. Operation:

7.1. Before starting, pump must be primed (free of air and suction pipe full of liquid) and discharge valve partially open.

CAUTION

Pumped liquid provides lubrication. If pump is run dry, rotating parts will seize and mechanical seal will be damaged. Do not operate at or near zero flow. Energy imparted to the liquid is converted into heat. Liquid may flash to vapor. Rotating parts require liquid to prevent scoring or seizing.

7.2. Make complete check after unit is run under operating conditions and temperature has stabilized. Check for expansion of piping. On frame-mounted units coupling alignment may have changed due to the temperature differential between pump and motor. Recheck alignment.

8. Maintenance:

8.1. Close-Coupled Unit. Ball bearings are located in and are part of the motor. They are permanently lubricated. No greasing required.

8.2. Frame-Mounted Units:

8.2.1. Bearing frame should be regreased every 2,000 hours or 3 month interval, whichever occurs first. Use a #2 sodium or lithium based grease. Fill until grease comes out of relief fittings, or lip seals, then wipe off excess.

8.2.2. Follow motor and coupling manufacturers' lubrication instructions.

8.2.3. Alignment must be rechecked after any maintenance work involving any disturbance of the unit.

9. Disassembly:

Complete disassembly of the unit will be described. Proceed only as far as required to perform the maintenance work needed.

9.1. Turn off power.

9.2. Drain system. Flush if necessary.

9.3. Close-Coupled Units: Remove motor hold-down bolts.

Frame-Mounted Units: Remove coupling, spacer, coupling guard and frame hold-down bolts.

9.4. Disassembly of Liquid End:

9.4.1. Remove casing bolts (370).

9.4.2. Remove back pull-out assembly from casing (100).

9.4.3. Remove impeller locknut (304).

CAUTION

Do not insert screwdriver between impeller vanes to prevent rotation of close-coupled units. Remove cap at opposite end of motor. A screwdriver slot or a pair of flats will be exposed. Using them will prevent impeller damage.

9.4.4. Remove impeller (101) by turning counter-clockwise when looking at the front of the pump. Protect hand with rag or glove.

CAUTION

Failure to remove the impeller in a counter-clockwise direction may damage threading on the impeller, shaft or both.

9.4.5. With two pry bars 180 degrees apart and inserted between the seal housing (184) and the motor adapter (108), carefully separate the two parts. The mechanical seal rotary unit (383) should come off the shaft with the seal housing.

9.4.6. Push out the mechanical seal stationary seat from the motor side of the seal housing.

9.5. Disassembly of Bearing Frame:

9.5.1. Remove bearing cover (109).

9.5.2. Remove shaft assembly from frame (228).

9.5.3. Remove lip seals (138 & 139) from bearing frame and bearing cover if worn and are being replaced.

9.5.5. Use bearing puller or arbor press to remove ball bearings (112 & 168).

10. Reassembly:

10.1. All parts should be cleaned before assembly.

10.2. Refer to parts list to identify required replacement items. Specify pump index or catalog number when ordering parts.

10.3. Reassembly is the reverse of disassembly.

10.3.1. Impeller and impeller locknut assembled onto motor shaft with 10 ft-lbs of torque.

10.4. Observe the following when reassembling the bearing frame:

10.4.1. Replace lip seals if worn or damaged.

10.4.2. Replace ball bearings if loose, rough or noisy when rotated.

10.4.3. Check shaft for runout. Maximum permissible is .002" T.I.R.

10.5. Observe the following when reassembling the liquid-end:

10.5.1. All mechanical seal components must be in good condition or leakage may result. Replacement of complete seal assembly, whenever seal has been removed, is good standard practice.

It is permissible to use a light lubricant, such as glycerin, to facilitate assembly. Do not contaminate the mechanical seal faces with lubricant.

10.5.2. Inspect casing O-ring (513) and replace if damaged. This O-ring may be lubricated with petroleum jelly to ease assembly.

10.5.3. Inspect guidevane O-ring (349) and replace if worn.

CAUTION

Do not lubricate guidevane O-ring (349). Insure it is not pinched by the impeller on reassembly.

10.6. Check reassembled unit for binding. Correct as required.

10.7. Tighten casing bolts in a star pattern to prevent O-ring binding.

11. Trouble Shooting Chart:

MOTOR NOT RUNNING

(See causes 1 thru 6)

LITTLE OR NO LIQUID DELIVERED:

(See causes 7 thru 17)

POWER CONSUMPTION TOO HIGH:

(See causes 4, 17, 18, 19, 22)

EXCESSIVE NOISE AND VIBRATION:

(See causes 4, 6, 9, 13, 15, 16, 18, 20, 21, 22)

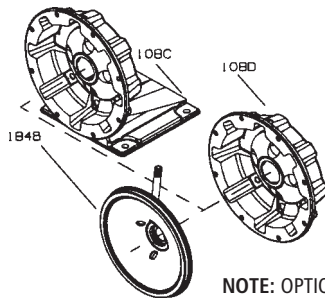
PROBABLE CAUSE:

1. Tripped thermal protector
2. Open circuit breaker
3. Blown fuse
4. Rotating parts binding
5. Motor wired improperly
6. Defective motor
7. Not primed
8. Discharge plugged or valve closed
9. Incorrect rotation
10. Foot valve too small, suction not submerged, inlet screen plugged.
11. Low voltage
12. Phase loss (3-phase only)
13. Air or gasses in liquid
14. System head too high
15. NPSHA too low:
Suction lift too high or suction losses excessive.
Check with vacuum gauge.
16. Impeller worn or plugged
17. Incorrect impeller diameter
18. Head too low causing excessive flow rate
19. Viscosity or specific gravity too high
20. Worn bearings
21. Pump or piping loose
22. Pump and motor misaligned

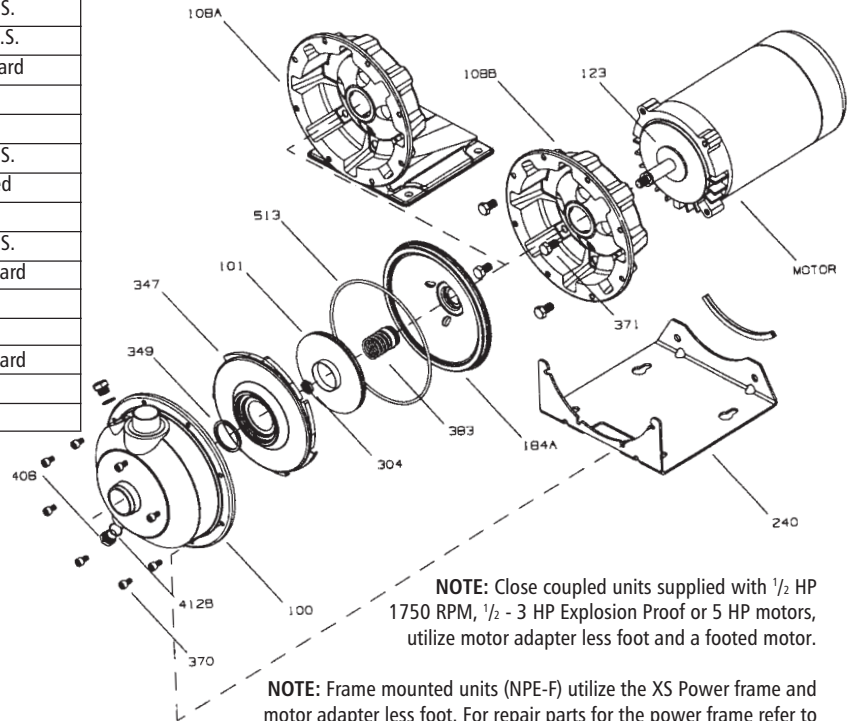
NPE Standard Repair Parts List

Item No.	Description	Materials of Construction
100	Casing	AISI 316L Stainless Steel
101	Impeller	
108A	Motor adapter with foot	
108B	Motor adapter less foot	
108C	Motor adapter with foot and Flush	
108D	Motor adapter less foot with Flush	
123	Deflector	BUNA-N
184A	Seal housing std.	AISI 316L S.S.
184B	Seal housing with seal flush	
240	Motor support	300 S.S.
	Rubber channel	Rubber
304	Impeller locknut	AISI 316 S.S.
347	Guidevane	AISI 316L S.S.
349	Seal-Ring, guidevane	Viton Standard
		EPR
		BUNA
370	Socket head screw, casing	AISI 410 S.S.
371	Bolts, motor	Steel/plated
383	Mechanical seal	
408	Drain and vent plug, casing	AISI 316 S.S.
412B	O-Ring, drain plugs	Viton, standard
		EPR
		BUNA
		Viton, standard
513	O-Ring, casing	EPR
		BUNA
		BUNA

Item 383 Mechanical Seal (3/8" seal)				
Rotary	Stationary	Elastomers	Metal Parts	Part No.
Carbon	Sil-Carbide	EPR	316SS	10K18
		Viton		10K55
EPR		10K81		
Viton		10K62		



NOTE: OPTIONAL SEAL FLUSH COMPONENTS



NOTE: Close coupled units supplied with 1/2 HP 1750 RPM, 1/2 - 3 HP Explosion Proof or 5 HP motors, utilize motor adapter less foot and a footed motor.

NOTE: Frame mounted units (NPE-F) utilize the XS Power frame and motor adapter less foot. For repair parts for the power frame refer to the XS-Power frame repair parts page in the parts section of your catalog. To order the power frame complete order item 14L61

GOULDS PUMPS LIMITED WARRANTY

This warranty applies to all water systems pumps manufactured by Goulds Pumps.

Any part or parts found to be defective within the warranty period shall be replaced at no charge to the dealer during the warranty period. The warranty period shall exist for a period of twelve (12) months from date of installation or eighteen (18) months from date of manufacture, whichever period is shorter.

A dealer who believes that a warranty claim exists must contact the authorized Goulds Pumps distributor from whom the pump was purchased and furnish complete details regarding the claim. The distributor is authorized to adjust any warranty claims utilizing the Goulds Pumps Customer Service Department.

The warranty excludes:

- (a) Labor, transportation and related costs incurred by the dealer;
- (b) Reinstallation costs of repaired equipment;
- (c) Reinstallation costs of replacement equipment;
- (d) Consequential damages of any kind; and,
- (e) Reimbursement for loss caused by interruption of service.

For purposes of this warranty, the following terms have these definitions:

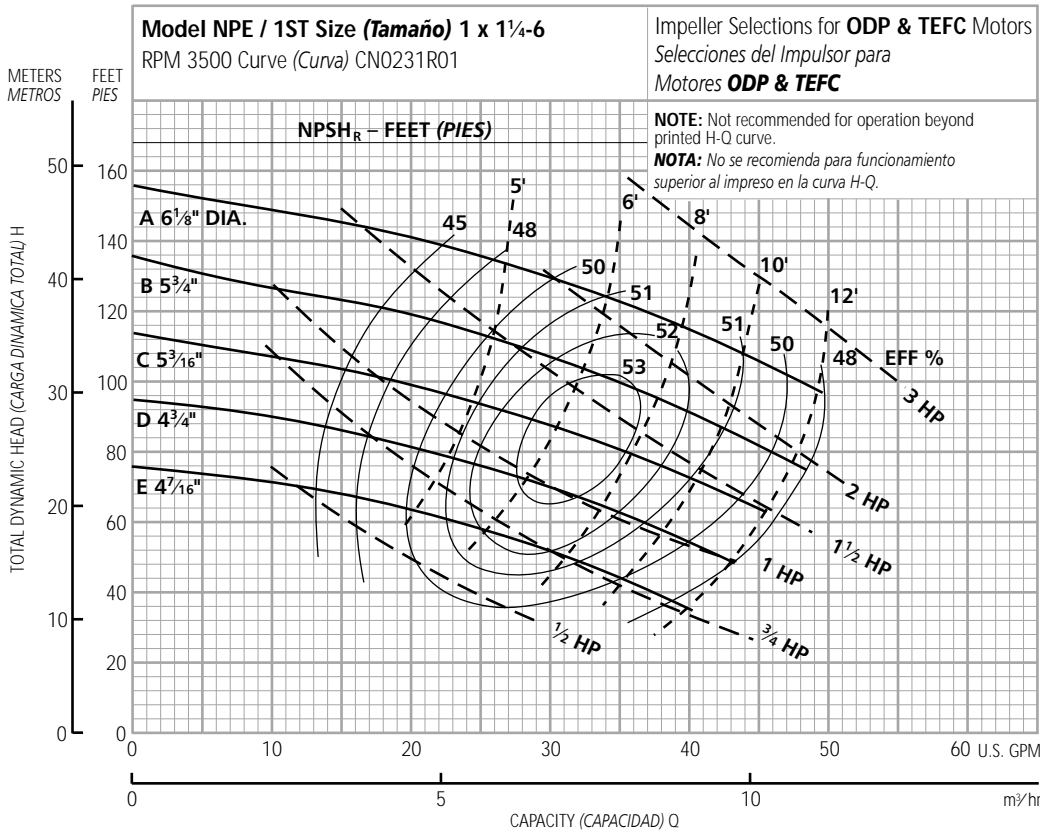
- (1) "Distributor" means any individual, partnership, corporation, association, or other legal relationship that stands between Goulds Pumps and the dealer in purchases, consignments or contracts for sale of the subject pumps.
- (2) "Dealer" means any individual, partnership, corporation, association, or other legal relationship which engages in the business of selling or leasing pumps to customers.
- (3) "Customer" means any entity who buys or leases the subject pumps from a dealer. The "customer" may mean an individual, partnership, corporation, limited liability company, association or other legal entity which may engage in any type of business.

THIS WARRANTY EXTENDS TO THE DEALER ONLY.

Goulds Pumps and the ITT Engineered Blocks Symbol are registered trademarks and tradenames of ITT Industries.

Visit us at www.goulds.com

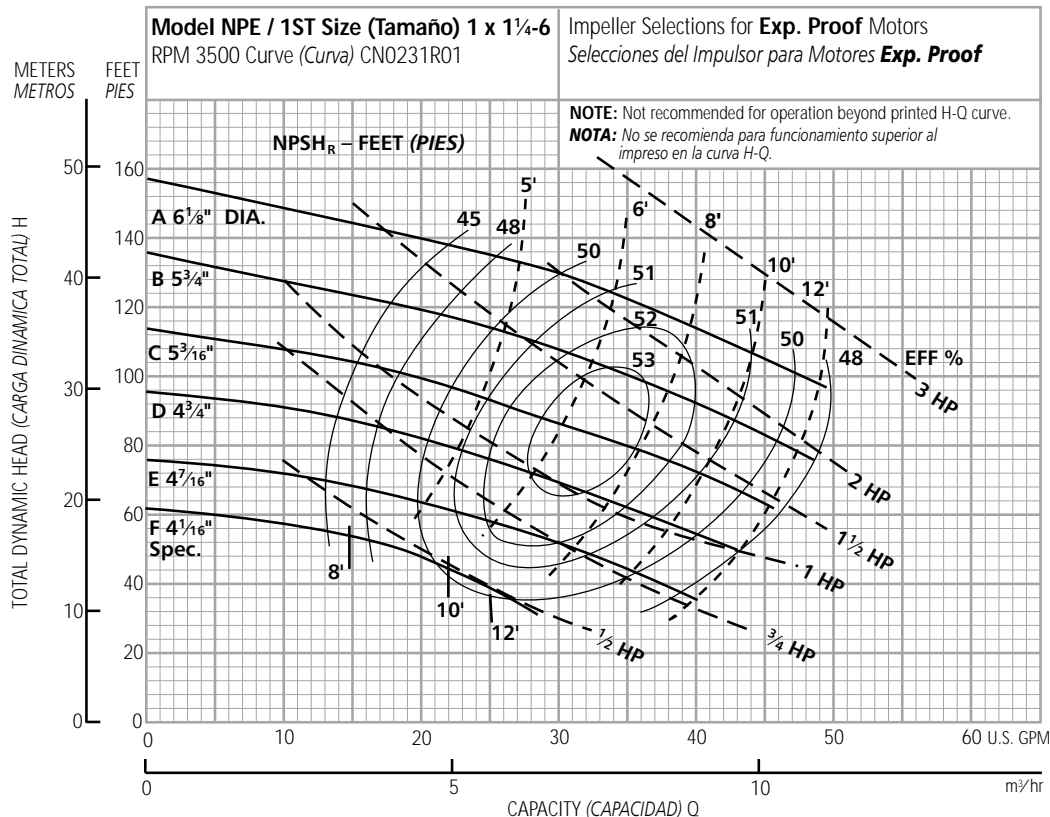
Performance Curves – 60 Hz, 3500 RPM
Curvas de Funcionamiento – 60 Hz, 3500 RPM



Ordering Code, Código de Pedido	Standard HP Rating, Estándar HP Potencia	Imp. Dia.
E	1/2	4 7/16"
D	3/4	4 3/4"
C	1	5 3/16"
B	1 1/2	5 3/4"
A	2	6 1/8"

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".

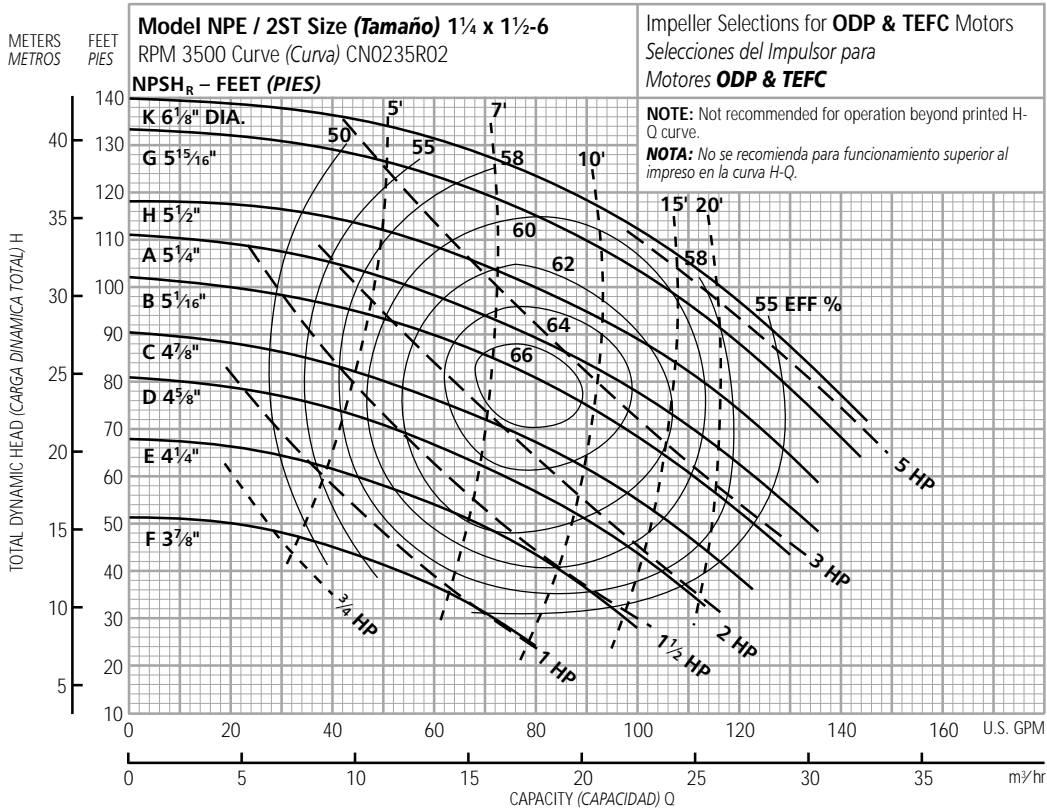


Ordering Code, Código de Pedido	Standard HP Rating, Estándar HP Potencia	Imp. Dia.
F	1/2	4 1/16" spec.
E	3/4	4 7/16"
D	1	4 3/4"
C	1 1/2	5 3/16"
B	2	5 3/4"
A	3	6 1/8"

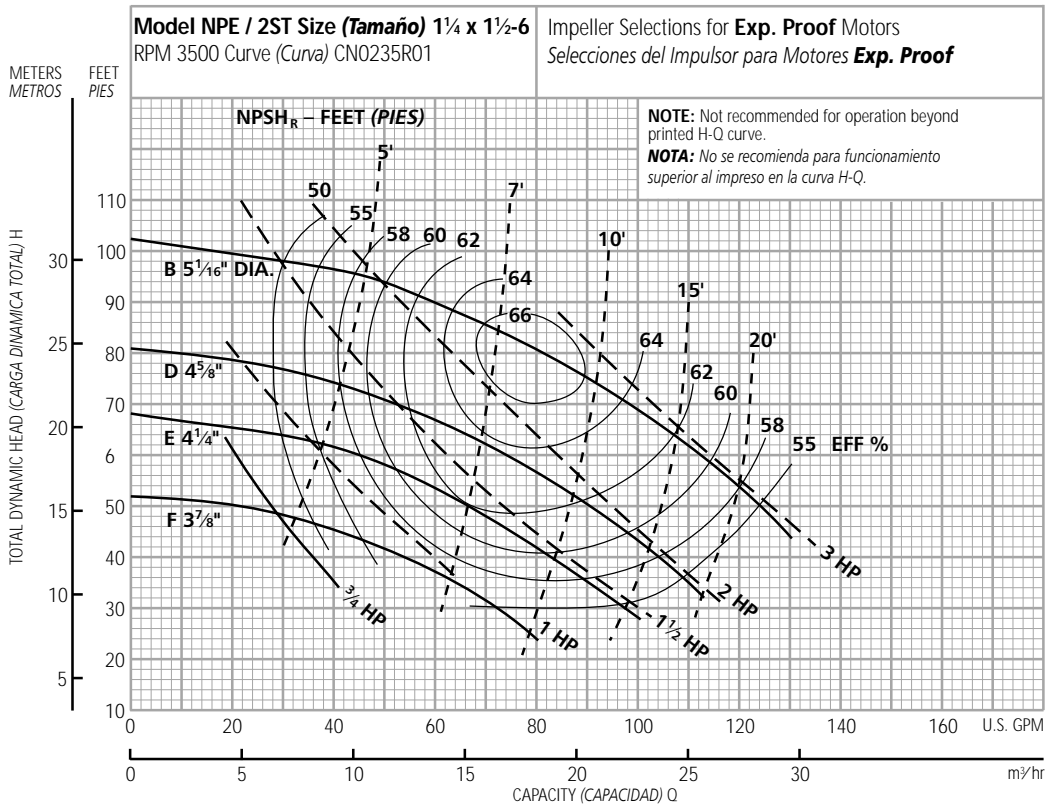
NOTE: Although not recommended, the pump may pass a 1/16" sphere.

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

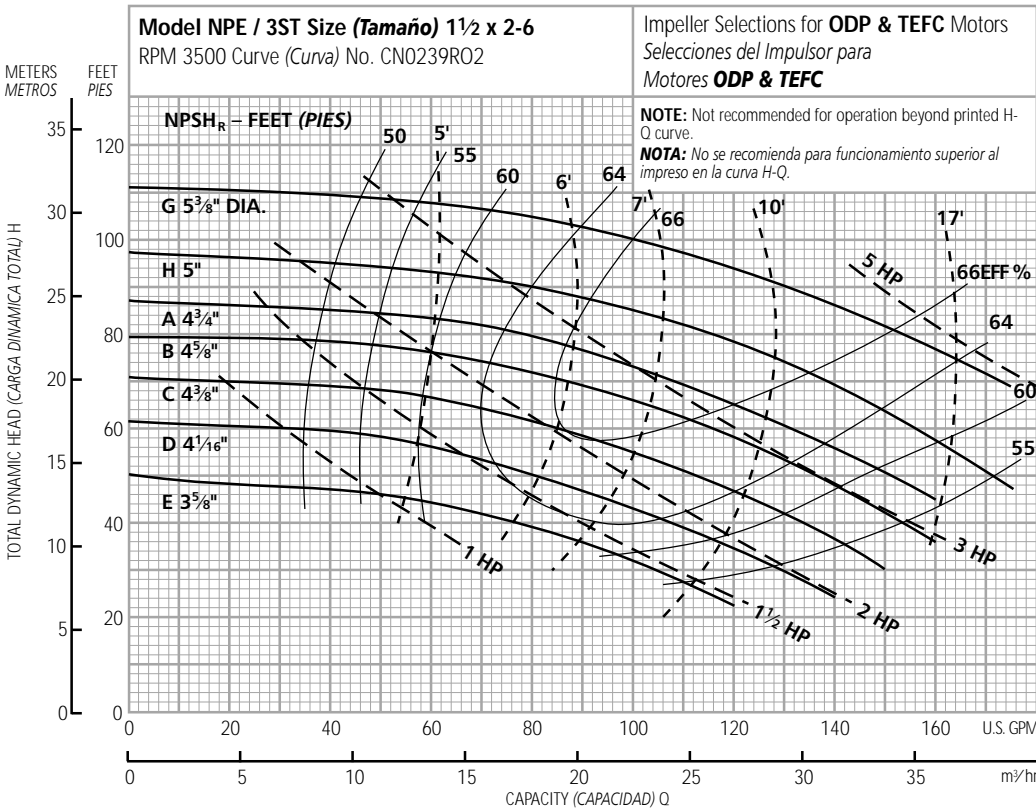


NOTE: Although not recommended, the pump may pass a 3/16" sphere.
NOTA: Si bien no se recomienda, la bomba puede pasar una esfera de 3/16".



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".

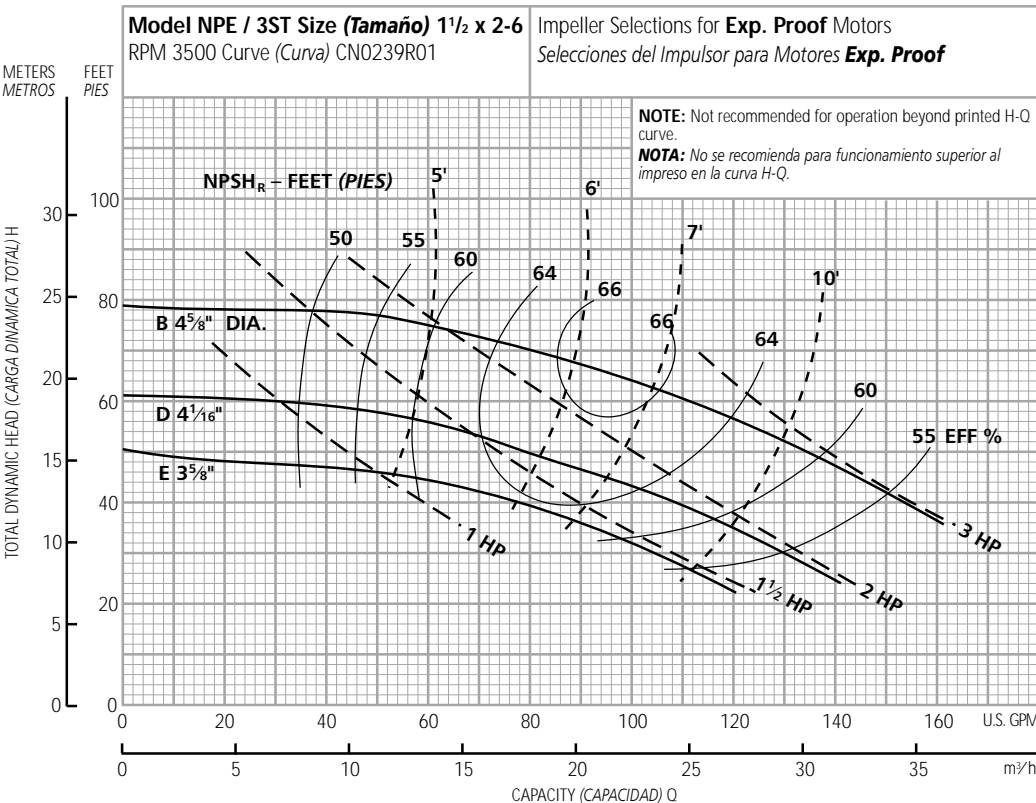
Performance Curves – 60 Hz, 3500 RPM
Curvas de Funcionamiento – 60 Hz, 3500 RPM



Ordering Code, Código de Pedido	Standard HP Rating, Estándar HP Potencia	Imp. Dia.
E	1	3⅝"
D	1½	4⅛"
C	2	4⅜"
B	3	4⅝"
A	3	4¾"
H	5	5"
G	5	5½"

NOTE: Although not recommended, the pump may pass a 1⅜" sphere.

NOTA: Si bien no se recomienda, la bomba puede pasar una esfera de 1⅜".



Ordering Code, Código de Pedido	Standard HP Rating, Estándar HP Potencia	Imp. Dia.
E	1½	3⅝"
D	2	4⅛"
B	3	4⅝"

NOTE: Although not recommended, the pump may pass a 1⅜" sphere.

NOTA: Si bien no se recomienda, la bomba puede pasar una esfera de 1⅜".

Repair Parts

MODEL

NPE/NPE-F

TABLE OF CONTENTS

NPE END SUCTION

NPE Product Line Numbering System	1
NPE Seal Chart (Part of Numbering System)	1
Parts List	2
Optional Components	2
Pictorial Breakdown of Pump	3
Impeller Chart Standard Impeller by Impeller Code	4
Impeller Chart by Motor Size at 3500 RPM	4
Motor Chart	5

NOTE:

For units built before September, 1997
The following upgrades are interchangeable.

- (1) Item 349 Guidevane O-Ring was upgraded from O-Ring to Square Seal Ring.
- (2) Pump Components have been upgraded from 304 SS to 316L SS
- (3) Mechanical Seal upgrades as noted on page 1
- (4) Pump Mounting location for motor adapter with foot to pump support are interchangeable.

SEAL VENT/FLUSH OPTION
MECHANICAL SEAL and O-RING

4 = Pre-Engineered Standard

For Optional Mechanical Seal modify catalog order no. with Seal Code listed below.

21 Mechanical Seal (5/8" seal)						
Seal Code	Rotary	Stationary	Elastomers	Metal Parts	Part No.	Casing O-Ring
2	Carbon	Sil-Carbide	EPR	316 SS	10K18*	EPR
			Viton		10K55***	Viton
5			EPR		10K81	EPR
6	Sil-Carbide		Viton		10K62**	Viton

Note: *Replaces obsolete 10K56

**Replaces obsolete 10K29

***Replaces obsolete 10K46 and 10K24

Impeller Option Code . . . No Adder Required

For Optional Impeller Diameters modify catalog order no. with Impeller code listed below.

Select Optional Impeller Diameter from Pump Performance Curve.

Impeller Code	Pump Size		
	1 x 1¼-6	1¼ x 1½-6	1½ x 2-6
K		6 1/8	
G		5 5/16	5 3/8
H		5 1/2	5
A	6 1/8	5 1/4	4 3/4
B	5 3/4	5 1/16	4 5/8
C	5 3/16	4 7/8	4 3/8
D	4 3/4	4 5/8	4 1/16
E	4 7/16	4 1/4	3 5/8
F	4 1/16	3 7/8	

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

For critical application conditions consult factory.

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

- DRIVER**
- 1 = 1PH, ODP 4 = 1 PH, TEFC 7 = 3 PH, XP
 - 2 = 3 PH, ODP 5 = 3 PH, TEFC 8 = 575 V, XP
 - 3 = 575 V, ODP 6 = 575 V, TEFC 0 = 1 PH, XP

- HP RATING**
- C = ½ HP F = 1½ HP J = 5 HP
 - D = ¾ HP G = 2 HP
 - E = 1 HP H = 3 HP

- DRIVER: HERTZ/POLE/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

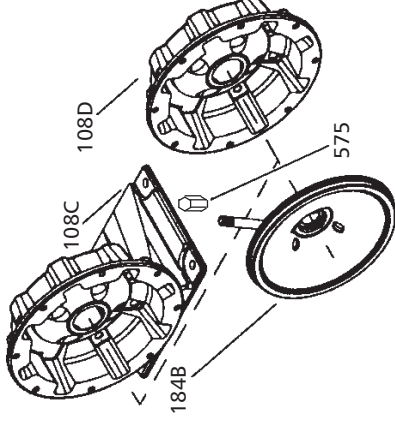
- PUMP SIZE**
- 1 = 1 x 1¼ - 6 2 = 1¼ x 1½ - 6 3 = 1½ x 2 - 6

For Frame Mounted version, substitute the letters "FRM" in these positions.

NPE STANDARD REPAIR PARTS LIST

Item No.	Description	Materials of Construction	1ST 1 x 1 1/4	2ST 1 1/4 x 1 1/2	3ST 1 1/2 x 2	QTY.
100	Casing		1L81	1L82	1L83	1
101	Impeller		See Impeller chart on page 4			1
108A	Motor adapter with foot	AISI 316L SS	1L80			
108B	Motor adapter less foot		1L87			1
108C	Motor adapter with foot & flush		1L334			
108D	Motor adapter less foot with flush		1L335			
123	Deflector		BUNA-N	5K7		
184A	Seal housing standard	AISI 316L SS	1L79			1
184B	Seal housing with seal flush		1L333			
240	Motor support	300 SS	4L320			1
	Rubber channel	Rubber	9K188			1
304	Impeller locknut	AISI 316 SS	13K286			1
347	Guidevane	AISI 316L SS	3L23	3L24	3L25	1
349	Seal ring, guidevane	Viton standard	5K269		5K270	1
		EPR	5K273		5K274	
		BUNA	5K271		5K272	
370	Socket head screw, casing	AISI 410 SS		13L65		8
371	Bolts, motor	Steel/plated		13K252		4
383	Mechanical seal		See Mechanical Seal Chart on Page 1			1
408	Drain and vent plug, casing	AISI 316 SS		6L3		2
412B	O-ring, drain plugs	Viton, standard		5L99		2
		EPR		5L80		
		BUNA		5L62		
513	O-ring, casing	Viton standard		5K206		1
		EPR		5K193		
		BUNA		5K4		
575	Pipe Cap	304 SS		6K150		1

NOTE:
OPTIONAL SEAL FLUSH COMPONENTS

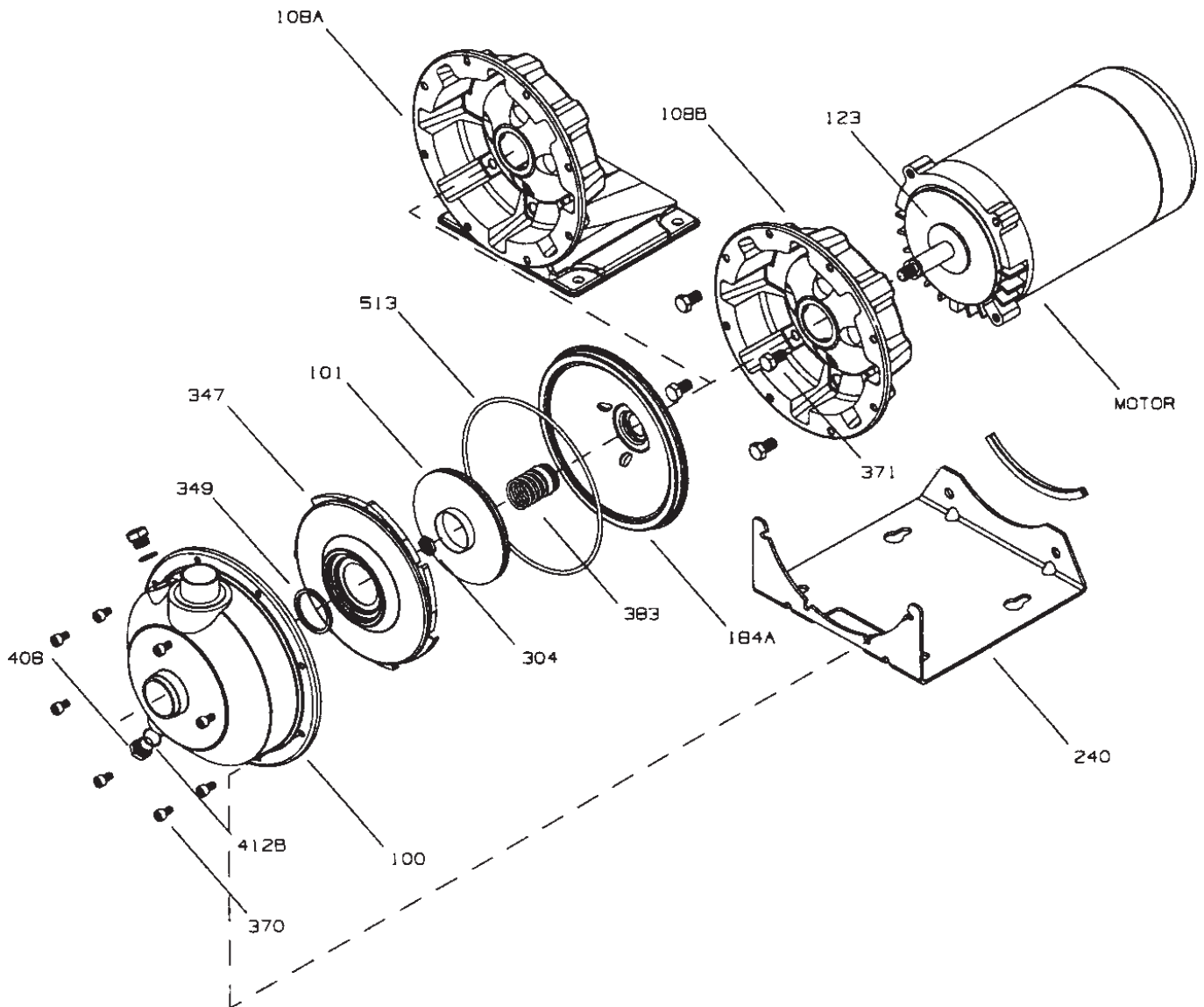


NOTE:

Close coupled units supplied with ½ HP 1750 RPM, ½ - 3 HP Explosion Proof or 5 HP motors, utilize motor adapter less foot and a footed motor.

NOTE:

Frame mounted units (NPE-F) utilize the XS Power Frame and motor adapter less foot. For repair parts for the power frame refer to the XS-Power frame repair parts page in the parts section of your catalog. To order the power frame complete order item 14L61.



NPE STANDARD IMPELLERS

Impeller Code	Pump Size							
	1 x 1¼-6		1¼ x 1½-6		1½ x 2-6			
	Diameter	Part No.	Diameter	Part No.	Diameter	Part No.		
K			6⅞	2L885				
G			5 ¹⁵ / ₁₆	2L700			5 ³ / ₈	2L702
H			5½	2L699			5	2L701
A	6⅞	2L47	5¼	2L48	4¾	2L49		
B	5¾	2L44	5 ¹ / ₁₆	2L54	4 ⁵ / ₈	2L58		
C	5 ³ / ₁₆	2L46	4 ⁷ / ₈	2L53	4 ³ / ₈	2L57		
D	4¾	2L42	4 ⁵ / ₈	2L52	4 ¹ / ₁₆	2L56		
E	4 ⁷ / ₁₆	2L45	4¼	2L51	3 ³ / ₈	2L55		
F	4 ¹ / ₁₆	2L59	3 ⁷ / ₈	2L50				

NPE STANDARD IMPELLERS BY MOTOR SIZE AT 3500 RPM

For ODP/TEFC Units Built After September 1, 1997

HP	HP Code		1ST	2ST	3ST	
			ODP/TEFC	ODP/TEFC	ODP/TEFC	
½	C	Repair #	2L45			
		Dia.	4 ⁷ / ₁₆			
		Imp. Code	E			
¾	D	Repair #	2L42	2L50		
		Dia.	4¾	3 ⁷ / ₈		
		Imp. Code	D	F		
1	E	Repair #	2L46	2L51	2L55	
		Dia.	5 ³ / ₁₆	4¼	3 ⁵ / ₈	
		Imp. Code	C	E	E	
1½	F	Repair #	2L44	2L52	2L56	
		Dia.	5¾	4 ⁵ / ₈	4 ¹ / ₁₆	
		Imp. Code	B	D	D	
2	G	Repair #	2L47	2L53	2L57	
		Dia.	6⅞	4 ⁷ / ₈	4 ³ / ₈	
		Imp. Code	A	C	C	
3	H	Repair #	2L47	2L48	2L49	
		Dia.	6⅞	5¼	4¾	
		Imp. Code	A	A	A	
5	J	Repair #		2L700	2L885	2L702
		Dia.		5 ¹⁵ / ₁₆	6⅞	5 ³ / ₈
		Imp. Code		G	K	G

For Current Explosion Proof and All Units Built Before September 1, 1997

HP	HP Code		1ST		2ST		3ST	
			ODP	TEFC/EXP	ODP	TEFC/EXP	ODP	TEFC/EXP
½	C	Repair #	2L45	2L59				
		Dia.	4 ⁷ / ₁₆	4 ¹ / ₁₆				
		Imp. Code	E	F				
¾	D	Repair #	2L42	2L45	2L50			
		Dia.	4¾	4 ⁷ / ₁₆	3 ⁷ / ₈			
		Imp. Code	D	E	F			
1	E	Repair #	2L46	2L42	2L51	2L50	2L55	
		Dia.	5 ³ / ₁₆	4¾	4¼	3 ⁷ / ₈	3 ⁵ / ₈	
		Imp. Code	C	D	E	F	E	
1½	F	Repair #	2L44	2L46	2L52	2L51	2L56	2L55
		Dia.	5¾	5 ³ / ₁₆	4 ⁵ / ₈	4¼	4 ¹ / ₁₆	3 ⁵ / ₈
		Imp. Code	B	C	D	E	D	E
2	G	Repair #	2L47	2L44	2L53	2L52	2L57	2L56
		Dia.	6⅞	5¾	4 ⁷ / ₈	4 ⁵ / ₈	4 ³ / ₈	4 ¹ / ₁₆
		Imp. Code	A	B	C	D	C	D
3	H	Repair #	2L47	2L47	2L48	2L54	2L49	2L58
		Dia.	6⅞	6⅞	5¼	5 ¹ / ₁₆	4¾	4 ⁵ / ₈
		Imp. Code	A	A	A	B	A	B
5	J	Repair #			2L700	2L885		2L702
		Dia.			5 ¹⁵ / ₁₆	6⅞		5 ³ / ₈
		Imp. Code			G	K		G

Note:** Max. Explosion Proof rating is 2 HP.

NPE CLOSE-COUPLED MOTORS

MODEL NPE 3500 RPM

HP	Single-Phase, 60 Hz, 115/230 V**, 56J Frame								
	Open, Drip-Proof ^①			Totally Enclosed, Fan Cooled			Explosion Proof		
	Order No.	Max. Amps	Wt. (lbs.)	Order No.	Max. Amps	Wt. (lbs.)	Order No.	Max. Amps	Wt. (lbs.)
1/2	E04853S	10.0/5.0	16	E04821	6.2/3.1	21	BBC04825	6.2/3.1	47
3/4	E05853S	14.0/7.0	19	E05821	8.8/4.4	24	BBC05825	8.8/4.4	41
1	E06853S	16.0/8.0	22	E06821	11.6/5.8	26	BBC06825	11.6/5.8	49
1 1/2	E07858S	21.4/10.7	31	E07821	16.2/8.1	35	BBC07825	16.2/8.1	56
2	E08854	26.8/13.4	36	E08821	20.8/10.4	39	BBC08825	20.8/10.4	60
3	E09854	14.0	40	E09821	11.89	44			
5	E10754	14.4	55						

Note:** 3 and 5 HP Single-Phase motors are 230 V only.

HP	Three-Phase, 60 Hz, 208-230/460 V, 56J Frame								
	Open, Drip-Proof ^①			Totally Enclosed, Fan Cooled			Explosion Proof		
	Order No.	Max. Amps	Wt. (lbs.)	Order No.	Max. Amps	Wt. (lbs.)	Order No.	Max. Amps	Wt. (lbs.)
1/2	E04873	2.6/1.3	19	E04876	1.9/.95	18	BBC04875	1.9/.95	27
3/4	E05873	3.4/1.7	19	E05876	2.3/1.15	21	BBC05875	2.3/1.15	30
1	E06873	4.2/2.1	22	E06876	3.2/1.6	21	BBC06875	3.2/1.6	30
1 1/2	E07878	5.8/2.9	25	E07876	4.8/2.4	27	BBC07875	4.8/2.4	37
2	E08874	6.9/3.3	39	E08876	5.4/2.7	33	BBC08875	5.4/2.7	44
3	E09874	7.2/3.6	31	E09876	7.6/3.8	37			
5	E10774	7.2/14.4	50	E10876	6.2/12.4	48			

① For vertical mounting order motor canopy separately - 9K272 for 1/2, 3/4 and 1 HP single phase or 9K273 for all other ODP motors.

MODEL NPE 1750 RPM

HP	Single-Phase, 60 HZ, 115/230 V, 56J Frame								
	Open, Drip-Proof ^①			Totally Enclosed, Fan Cooled			Explosion Proof		
	Order No.	Max. Amps	Wt. (lbs.)	Order No.	Max. Amps	Wt. (lbs.)	Order No.	Max. Amps	Wt. (lbs.)
1/2	E04811	8.6/4.3	19	E04812	8.0/4.0	20	BBC04815	8.0/4.0	45

HP	Three-Phase, 60 HZ, 208-230/460 V, 56J Frame								
	Open, Drip-Proof ^①			Totally Enclosed, Fan Cooled			Explosion Proof		
	Order No.	Max. Amps	Wt. (lbs.)	Order No.	Max. Amps	Wt. (lbs.)	Order No.	Max. Amps	Wt. (lbs.)
1/2	E04831	3.76/4.0/2.0	20	E04832	1.77/1.6/.8	20	BBC04835	1.77/1.6/.8	45

Note: Explosion Proof Motors are class 1 and 2, Group D

Magnehelic® Differential Pressure Gage

OPERATING INSTRUCTIONS



SPECIFICATIONS

Dimensions: 4-3/4" dia. x 2-3/16" deep.

Weight: 1 lb. 2 oz.

Finished: Baked dark gray enamel.

Connections: 1/8" NPT high and low pressure taps, duplicated, one pair side and one pair back.

Accuracy: Plus or minus 2% of full scale, at 70°F. (Model 2000-0, 3%; 2000-00, 4%).

Pressure Rating: 15 PSI (0,35 bar)

Ambient Temperature Range: 20° to 140°F (-7 to 60°C).

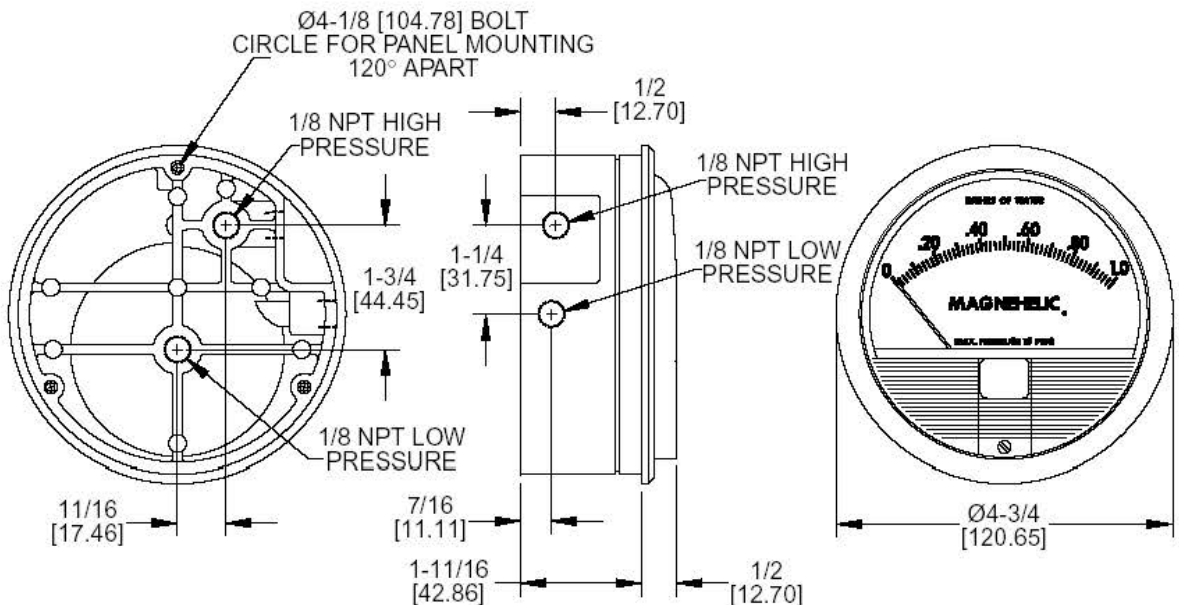
Standard gage accessories include two 1/8" NPT plugs for duplicate pressure taps, two 1/8" NPT pipe thread to rubber tubing adapters, and three flush mounting adapters with screws.



Caution: For use with air or compatible gases only.

For repeated over-ranging or high cycle rates, contact factory.

Not for use with Hydrogen gas. Dangerous reactions will occur.

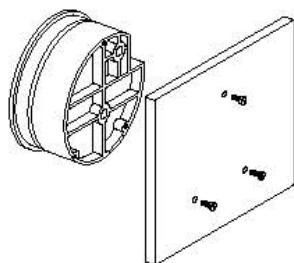


MAGNEHELIC® INSTALLATION

1. Select a location free from excessive vibration and where the ambient temperature will not exceed 140°F. Also, avoid direct sunlight which accelerates discoloration of the clear plastic cover. Sensing lines may be run any necessary distance. Long tubing lengths will not affect accuracy but will increase response time slightly. Do not restrict lines. If pulsating pressures or vibration cause excessive pointer oscillation, consult the factory for ways to provide additional damping.

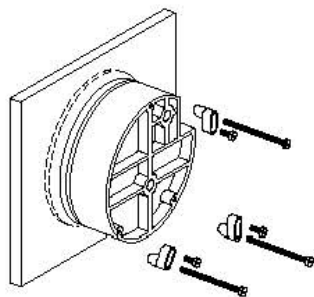
2. All standard Magnehelic gages are calibrated with the diaphragm vertical and should be used in that position for maximum accuracy. If gages are to be used in other than vertical position, this should be specified on the order. Many higher range gages will perform within tolerance in other positions with only rezeroing. Low range Model 2000-00 and metric equivalents must be used in the vertical position only.

3. Surface Mounting



Locate mounting holes, 120° apart on a 4-1/8" dia. circle. Use No. 6-32 machine screws of appropriate length.

4. Flush Mounting



Provide a 4-9/16" dia. opening in panel. Insert gage and secure in place with No. 6-32 machine screws of appropriate length, with adapters, firmly secured in place. To mount gage on 1-1/4"-2" pipe, order optional A-610 pipe mounting kit.

5. To zero the gage after installation

Set the indicating pointer exactly on the zero mark, using the external zero adjust screw on the cover at the bottom. Note that the zero check or adjustment can only be made with the high and low pressure taps both open to atmosphere.

Operation

Positive Pressure: Connect tubing from source of pressure to either of the two high pressure ports. Plug the port not used. Vent one or both low pressure ports to atmosphere.

Negative Pressure: Connect tubing from source of vacuum or negative pressure to either of the two low pressure ports. Plug the port not used. Vent one or both high pressure ports to atmosphere.

Differential Pressure: Connect tubing from the greater of two pressure sources to either high pressure port and the lower to either low pressure port. Plug both unused ports.

When one side of the gage is vented in dirty, dusty atmosphere, we suggest an A-331 Filter Vent Plug be installed in the open port to keep inside of gage clean.

A. For portable use of temporary installation use 1/8" pipe thread to rubber tubing adapter and connect to source of pressure with rubber or Tygon tubing.

B. For permanent installation, 1/4" O.D., or larger, copper or aluminum tubing is recommended. See accessory bulletin S-101 for fittings.

Ordering Instructions:

When corresponding with the factory regarding Magnehelic® gage problems, be sure to include model number, pressure range, and any special options. Field repair is not recommended; contact the factory for repair service.

MAINTENANCE

Maintenance: No lubrication or periodic servicing is required. Keep case exterior and cover clean. Occasionally disconnect pressure lines to vent both sides of gage to atmosphere and re-zero. Optional vent valves, (bulletin S-101), should be used in permanent installations.

Calibration Check: Select a second gage or manometer of known accuracy and in an appropriate range. Using short lengths of rubber or vinyl tubing, connect the high pressure side of the Magnehelic gage and the test gage to two legs of a tee. Very slowly apply pressure through the third leg. Allow a few seconds for pressure to equalize, fluid to drain, etc., and compare readings. If accuracy unacceptable, gage may be returned to factory for recalibration. To calibrate in the field, use the following procedure.

Calibration:

1. With gage case, held firmly, loosen bezel, by turning counterclockwise. To avoid damage, a canvas strap wrench or similar tool should be used.
2. Lift out plastic cover and "O" ring.
3. Remove scale screws and scale assembly. Be careful not to damage pointer.
4. The calibration is changed by moving the clamp. Loosen the clamp screw(s) and move slightly toward the helix if gage is reading high, and away if reading low. Tighten clamp screw and install scale assembly.
5. Place cover and O-ring in position. Make sure the hex shaft on inside of cover is properly engaged in zero adjust screw.
6. Secure cover in place by screwing bezel down snug. Note that the area under the cover is pressurized in operation and therefore gage will leak if not properly tightened.
7. Zero gage and compare to test instrument. Make further adjustments as necessary.

Caution: If bezel binds when installing, lubricate threads sparingly with light oil or molybdenum disulphide compound.

Warning: Attempted field repair may void your warranty. Recalibration or repair by the user is not recommended. For best results, return gage to the factory. Ship prepaid to:

Dwyer Instruments, Inc.
Attn: Repair Dept.
102 Indiana Highway 212
Michigan City, IN 46360

Trouble Shooting Tips:

•*Gage won't indicate or is sluggish.*

1. Duplicate pressure port not plugged.
2. Diaphragm ruptured due to overpressure.
3. Fittings or sensing lines blocked, pinched, or leaking.
4. Cover loose or "O" ring damaged, missing.
5. Pressure sensor, (static tips, Pitot tube, etc.) improperly located.
6. Ambient temperature too low. For operation below 20°F, order gage with low temperature, (LT) option.

•*Pointer stuck-gage can't be zeroed.*

1. Scale touching pointer.
2. Spring/magnet assembly shifted and touching helix.

3. Metallic particles clinging to magnet and interfering with helix movement.

4. Cover zero adjust shaft broken or not properly engaged in adjusting screw.

We generally recommend that gages needing repair be returned to the factory. Parts used in various sub-assemblies vary from one range of gage to another, and use of incorrect components may cause improper operation. After receipt and inspection, we will be happy to quote repair costs before proceeding.

Consult factory for assistance on unusual applications or conditions.

Use with air or compatible gases only.

QED p/n EZ-LOWP - Dwyer p/n 1950-1

Kit Includes Pressure Switch, Fitting, Barb & Tubing



Series 1950 - Explosion-Proof Differential Pressure Switches

Specifications - Installation and Operating Instructions

UL and CSA Listed, FM Approved For

CL. I GR. C, D - CL. II GR. E, F, G - CL. III

Series 1950 Switches

Operating ranges and deadbands

To order specify Model Number	Operating Range: Inches, W.C.	Approximate Dead Band	
		At Min. Set Point	At Max. Set Point
1950-02	0.03 to 0.10	0.025	0.05
1950-00	0.07 to 0.15	0.04	0.05
1950-0	0.15 to 0.5	0.10	0.15
1950-1	0.4 to 1.6	0.15	0.20
1950-5	1.4 to 5.5	0.3	0.4
1950-10	3.0 to 11.0	0.4	0.5
1950-20	4.0 to 20.0	0.4	0.6
Model Number	Operating Range: PSI	Approximate Dead Band	
		Min. Set Point	Max. Set Point
1950P-2	0.5 to 2.0	0.3 PSI	0.3 PSI
1950P-8	1.5 to 8.0	1.0 PSI	1.0 PSI
1950P-15	3.0 to 15.0	0.9 PSI	0.9 PSI
1950P-25	4.0 to 25.0	0.7 PSI	0.7 PSI
1950P-50	15.0 to 50	1.0 PSI	1.5 PSI

PHYSICAL DATA

Temperature Limits: -40° to 140°F (-40° to 60°C); 1950P-8, -15, -25, -50: 0° to 140°F (-17.8° to 60°C); 1950-02: -30° to 130°F (-34.4° to 54.4°C).

Rated Pressure: 1950: 45 in. w.c. (0.1 bar); 1950P: 35 psi (2.4 bar); 1950P-50 only: 70 psi (4.8 bar).

Maximum Surge Pressure: 1950: 10 psi (0.7 bar); 1950P: 50 psi (3.4 bar); 1950P-50 only: 90 psi (6.2 bar).

Pressure Connections: 1/8" NPT(F).

Electrical Rating: 15A, 125, 250, 480 volts, 60 Hz. AC Resistive 1/8 H.P. @ 125 volts, 1/4 H.P. @ 250 volts, 60 Hz. AC.

Wiring Connections: 3-screw type; common, normally open and normally closed.

Conduit Connections: 1/2" NPT(F).

Set point adjustment: Screw type on top of housing, field adjustable.

Housing: Anodized cast aluminum.

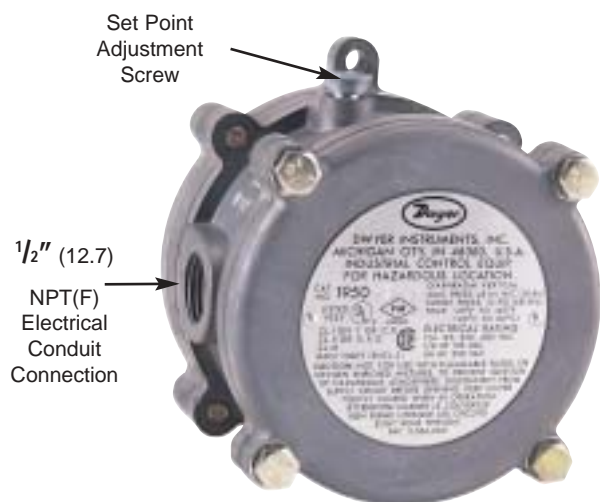
Diaphragm: Molded fluorosilicone rubber, 02 model: silicone on Nylon.

Calibration Spring: Stainless Steel

Installation: Mount with diaphragm in vertical position.

Weight: 3 1/4 lbs (1.5 kg), 02 model; 4 lbs, 7 oz. (2 kg).

RESPONSE TIME: Because of restrictive effect of flame arrestors, switch response time may be as much as 10-25 seconds where applied pressures are near set point.



Series 1950 Explosion-Proof Differential Pressure Switches combine the best features of the Dwyer Series 1900 Pressure Switch with an integral explosion-proof and weather-proof housing. Each unit is UL & CSA listed; FM approved for use in Class I, Groups C & D; Class II, Groups E, F, & G; and Class III atmospheres (NEMA 7 & 9). They are totally rain-tight for outdoor installations. Twelve models allow set-points from .03 to 20 inches w.c. and from .5 to 50 psi (3.4 to 345 kPa).

Easy access to the SPDT switch for electrical hook-up is provided by removing the top plate of the three-part aluminum housing. Adjustment to the set point of the switch can be made without disassembling the housing. The unit is very compact, about half the weight and bulk of equivalent conventional explosion-proof switches.

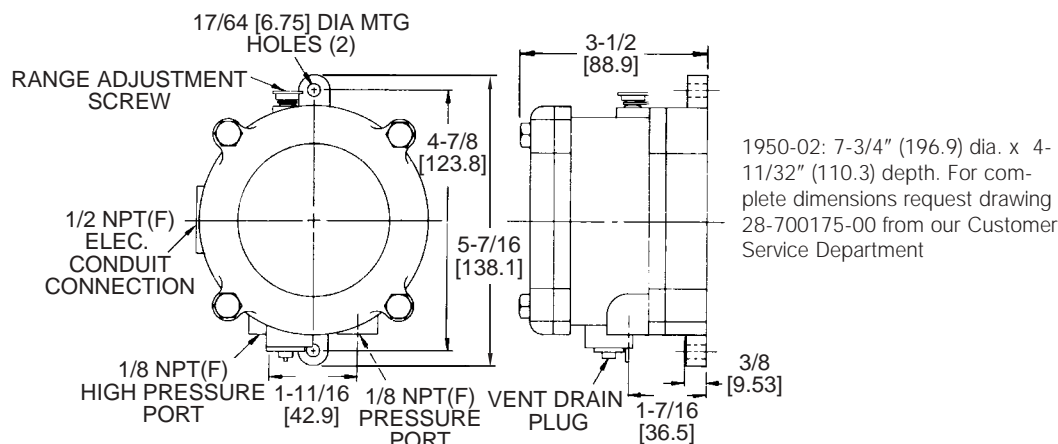
CAUTION

For use only with air or compatible gases. Use of the Model 1950 switch with explosive media connected to the Low pressure port (including differential pressure applications in such media) is not recommended. Switch contact arcing can cause an explosion inside the switch housing which, while contained, may render the switch inoperative. If switch is being used to sense a single positive pressure relative to atmosphere, run a line from the low pressure port to a non-hazardous area free of combustible gases. This may increase response time on -0 and -00 models.

NOTE: The last number-letter combination in the model number identifies the switch's electrical rating (number) and diaphragm material (letter). The 2F combination is standard as described in the physical data above. In case of special models, a number 1 rating is the same as 2; a number 3 or 4 rating is 10A 125, 250, 480 VAC; 1/8 H.P. 125 VAC; 1/4 H.P. 250 VAC; a number 5 or 6 rating is 1A 125 VAC. Letter B indicates a Buna-N diaphragm; N = Neoprene; S = Silicone; and V = Viton®.

Series 1950 – Explosion-Proof Differential Pressure Switches

Specifications - Installation and Operating Instructions



1950 Switch Outline Dimensions

INSTALLATION

1. Select a location free from excess vibration and corrosive atmospheres where temperatures will be within the limits noted under Physical Data on page 1. Switch may be installed outdoors or in areas where the hazard of explosion exists. See page 1 for specific types of hazardous service.

2. Mount standard switches with the diaphragm in a vertical plane and with switch lettering and Dwyer nameplate in an upright position. Some switches are position sensitive and may not reset properly unless they are mounted with the diaphragm vertical.

3. Connect switch to source of pressure, vacuum or differential pressure. Metal tubing with 1/4" O.D. is recommended, but any tubing which will not restrict the air flow can be used. Connect to the two 1/8" NPT(F) pressure ports as noted below:

- A. Differential pressures - connect pipes or tubes from source of greater pressure to high pressure port marked HIGH PRESS, and from source of lower pressure to low pressure port marked LOW PRESS.
- B. Pressure only (above atmospheric pressure) - connect tube from source of pressure to high pressure port. The low pressure port is left open to atmosphere.
- C. Vacuum only (below atmospheric pressure) - connect tube from source of vacuum to low pressure port. The high pressure port is left open to atmosphere.

4. To make electrical connections, remove the three hex head screws from the cover and after loosening the fourth captive screw, swing the cover aside. Electrical connections to the standard single pole, double throw snap switch are provided by means of terminals marked "COM" (common), "NO" (norm open), "NC" (norm closed). The normally open contacts close and the normally closed contacts open when pressure increases beyond the set point.

Switch loads for standard models should not exceed the maximum specified current rating of 15 amps resistive. Switch capabilities decrease with an increase in ambient temperature, load inductance, or cycling rate. Whenever an application involves one or more of these factors, the user may find it desirable to limit the switched current to 10 amps or less in the interest of prolonging switch life.

ADJUSTMENT: To Change the Set point

1. Remove the plastic cap and turn the slotted Adjust-ment Screw at the top of the housing clockwise to raise the set point pressure and counter-clockwise to lower the set point. After calibration, replace the plastic cap and re-check the set point.

2. The recommended procedure for calibrating or checking calibration is to use a "T" assembly with three rubber tubing leads, all as short as possible and the entire assembly offering minimum flow restriction. Run one lead to the pressure switch, another to a manometer of known accuracy and appropriate range, and apply pressure through the third tube. Make final approach to the set point very slowly. Note that manometer and pressure switch will have different response times due to different internal volumes, lengths of tubing, fluid drainage, etc. Be certain the switch is checked in the position it will assume in use, i.e. with diaphragm in a vertical plane and switch lettering and Dwyer nameplate in an upright position.

3. For highly critical applications check the set point adjustment and if necessary, reset it as noted in step A.

MAINTENANCE

The moving parts of these switches need no maintenance or lubrication. The only adjustment is that of the set point. Care should be taken to keep the switch reasonably clean. Periodically the vent drain plug should be rotated, then returned to its original position. This will dislodge deposits which could accumulate in applications where there is excessive condensation within the switch.

Warrick®

Series M Mechanical Tilt Float Switch

Installation and Operation Bulletin

Specifications

Cord	16 gauge, 2 or 3 conductor SJOW, Oil Resistant CPE
Contact Rating	13 amp @ 120/240 VAC, 1/2hp
Contact Design	SPST, Normally Open or Normally Closed, Common with N.O. & N.C. (Form C)
Temperature Rating	32°F to 140°F (0°C to 60°C)
Overall Weight	1.0 lbs. (not including weight)
Tether Method	Tie-wrap nylon, weight: 2.5 lbs.
Approvals	U.L. Recognized, CSA Certified

Installation

Tether Tie-Wrap (Fig 1)

Attach cord, using a tie-wrap, to a stationary structure. This is known as the tether point, it will determine the pumping range. The farther the float is placed from the tether point, the greater the pumping range. The minimum distance that the float should be placed from the tether point is 3 inches.

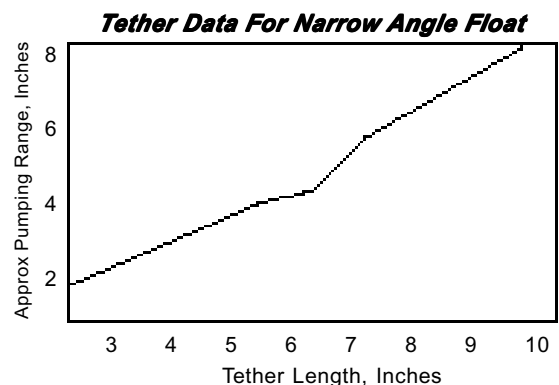
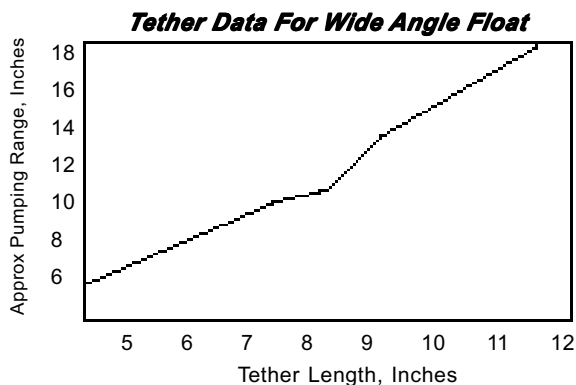
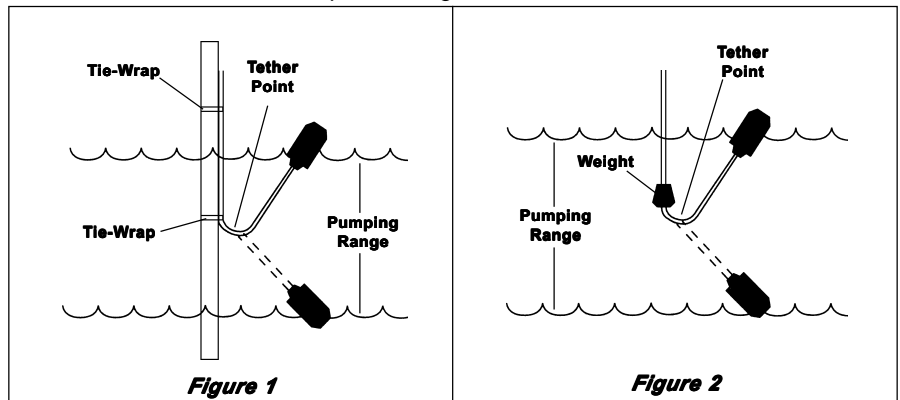
Tether-Weight (Fig 2)

Place tension-brand over the cord before installation. Place the weight at the desired position and secure with the tension-band. This position will determine the pumping range. The farther the float is placed from the tether point, the greater the pumping range. The minimum distance that the float should be placed from the tether point is 3 inches.

Notes:

1. To Prevent Motor Burnout - In a pumpdown application make sure the turn-off level is at least 2 inches above the intake of the submersible pump.
2. Securing Tether Points - Make sure levels are correct and that floats are free from any obstructions before securing tether points.
3. When using Tether Weight - Place the tension-band over the cord prior to installation.

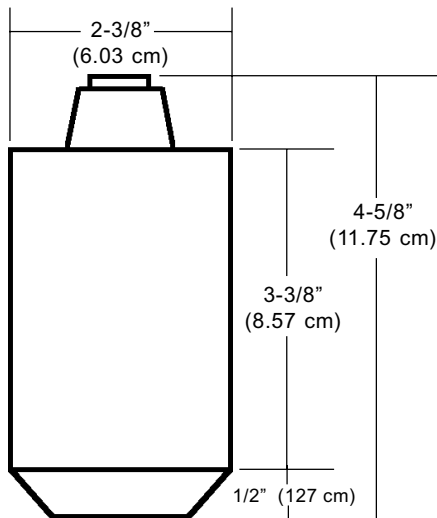
Determine tether point using charts below as a reference



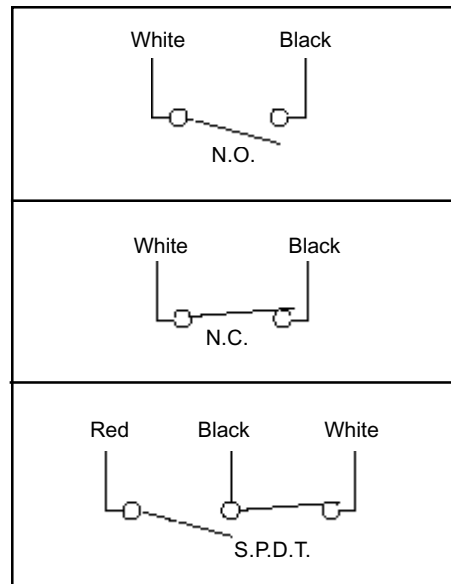
Notes:

1. Narrow angle pumping range is approximately 2 Ft. to 8 Ft.
2. Wide angle pumping range is approximately 5 Ft. to 18 Ft.

Dimensions



Contact Configurations



Important Points:

- Gems products must be maintained and installed in strict accordance with the National Electrical Code and the applicable Gems Product Instruction Bulletin that covers installation, operation and proper maintenance. Failure to observe this information may result in serious injury or damages.
- For hazardous area applications involving such things as, but not limited to, ignitable mixtures, combustible dust and flammable materials, use an appropriate explosionproof enclosure or intrinsically safe interface device.
- Please adhere to the pressure and temperature limitations shown throughout this catalog for our level and flow sensors. These limitations must not be exceeded. These pressures and temperatures take into consideration possible system surge pressures/temperatures and their frequencies.
- Selection of materials for compatibility with the media is critical to the life and operation of Gems products. Take care in the proper selection of materials of construction, testing is required.
- NSF-approved sensors are made of materials approved for potable water applications according to Standard 61.
- Stainless steel is generally regarded as safe by NSF and FDA.
- Life expectancy of switch contacts varies with application. Contact Gems if life cycle testing is required.
- Ambient temperature changes do affect switch set points, since the gravity of a liquid can vary with temperature.
- Our sensors have been designed to resist shock and vibration. However, shock and vibration should be minimized.
- Filter liquid media containing particulate and/or debris to ensure the proper operation of our products.
- Electrical entries and mounting points in an enclosed tank may require liquid/vapor sealing.
- Our sensors must not be field-repaired.
- Physical damage sustained by product may render it unserviceable.

Return Policy

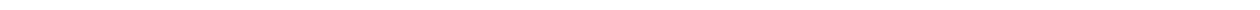
Returns are accepted on stock items up to 30 days from date of order. You must contact our Returns Department for a Return Authorization (RA) number. Return the goods - freight prepaid - in the original container and include original packing slip. C. O. D. returns are not accepted. Gems reserves the right to apply restocking charges.

Tel: 860-793-4357
Fax: 860-793-4563



Gems Sensors Inc.
One Cowles Road
Plainville, CT 06062-1198
Tel: 860-793-4579
Fax: 860-793-4580

Electrical and Instrumentation Assembly



SUPERIOR ELECTRIC
ELECTRIC CONTRACTING AND ELECTRONICS

LICENSE No. 243326






P.O. Box 271, SEASIDE, CA 93955
BUS. 394-0414 - FAX 394-6588

SUBMITTALS FOR SHAW ENVIORNMENTAL

SITE 2 & 12




	CATALOG NO.
1. BLUE HOSE CABLE	BELDEN 9463
2. ABB FREQUENCY DRIVES	ABB ACS550
3. CUTTLER HAMMER MOTOR PROTECTORS	HMCP070M
4. GF SIGNET 8750 PH TRANSMITTER	GF-SIGNET 8750

MINIATURE COAX CABLES - Blue Hose

Description	Trade & UL Type Number	Standard Lengths		Std. Pkg. (ft.)	Conductor (Plating) (Strands)	Insulation (Color) (OD)		Nominal (DIA)	Nominal (DIA)	Shield (Material) (Nom.)	Nominal (DIA)	Nominal (DIA)	Nominal (DIA)		Impedance (Standard)		
		ft.	m.			ft.	m.						ft.	m.	ft.	m.	ft.
	8700† 60C	25 50 100 250	7.6 15.2 30.5 76.2	.1 .2 .4 .7	28 (Solid) [.32] tinned copper 68.5Ω/M' 224.7Ω/km	Polypropylene .023 .58	.054 1.37	1 bare copper 41.5Ω/M' 136.2Ω/km 91% shield coverage	32	66%	48.0	157.5	400	55.0	180.5		
	9221 1375 60C	25 100 U-500 500	7.6 30.5 U-152.4 152.4	.2 1.0 4.0 3.9	30 (7x38) [.30] tinned copper 100.0Ω/M' 328.0Ω/km	Cellular Polypropylene .058 1.47	.097 2.46	1 tinned copper 8.5Ω/M' 27.9Ω/km 89% shield coverage	75	78%	17.3	56.7	50 100 200 400 700 900 1000	5.9 9.2 15.0 24.5 36.0 44.0 48.0	19.4 30.2 49.2 80.4 118.1 144.4 157.5		
	8218 60C	100 U-500 500 U-1000 1000	30.5 U-152.4 152.4 U-304.8 304.8	1.8 7.9 7.6 14.8 15.6	27 (7x35) [.43] bare copper covered steel 112.0Ω/M' 367.5Ω/km	Polyethylene 100 2.54	.150 3.81	1 tinned copper 6.5Ω/M' 21.3Ω/km 93% shield coverage	75	66%	20.5	67.3	50 100 200 400 700 900 1000	3.9 5.7 8.3 12.1 16.5 19.0 20.0	12.8 18.7 27.2 39.7 54.1 62.3 65.6		
	9264† 1511 300V 60C	100 250 500 1000	30.5 76.2 152.4 304.8	1.4 3.0 5.8 11.9	24 (7x32) [.64] Uni-strand® 23.6Ω/M' 77.4Ω/km	Flame Retardant Polyethylene .078 1.98	122 3.10 x x 146 3.71	1 BELDFOIL® & drain wire 23.6Ω/M' 77.4Ω/km 100% shield coverage	50	62%	34.0	111.5	—	—	—		
	9393 1354 60C	100 500 1000	30.5 152.4 304.8	.5 2.9 5.1	30 (Solid) coated copper [.25] 114Ω/M' Max. 372.7Ω/km Max.	Cellular Polyethylene .064 1.63	100 2.54 x x 115 2.92	1 BELDFOIL & drain wire 55Ω/M' Max. 180.4Ω/km Max. 100% shield coverage	93	78%	14.0	45.9	50 100 200 400	6.4 8.8 12.4 17.5	21.0 28.9 40.7 57.4		

PRODUCT DESCRIPTION: Twinaxial transmission line cables offer low-loss signal transmission which remains unaffected by outside signals or noise fields. Recommended for RF applications requiring a cross-talk free balanced operation.

TWINAXIAL CABLES

	9463† 2582 80C	100 U-500 500 U-1000 1000	30.5 U-152.4 152.4 U-304.8 304.8	3.9 17.8 18.6 34.6 37.6	2 cond. 20 (7x28) [.97] tinned copper 9.5Ω/M' 31.2Ω/km	Polyethylene color coded white, blue	243 6.17	1 BELDFOIL + 57% tinned copper braid 4.05Ω/M' 13.29Ω/km 100% shield coverage	78	66%	19.7	64.6	1 10 20 50 100 200 400	.6 2.1 2.5 3.6 7.5 11.0 16.0	2.0 6.9 8.2 11.8 24.6 36.1 52.5		
	9250† 80C 22B/U TYPE	100 500 1000	30.5 152.4 304.8	13.5 64.6 127.3	2 cond. 18 (7x 0152) [1.16] bare copper, one conductor has tinned center strand 6.55Ω/M' 21.5Ω/km	Polyethylene 285 7.24	420 10.67	2 tinned copper .88Ω/M' 2.9Ω/km 96% shield coverage	95	66%	16.0	52.5	1 10 20 50 100 200 400	.3 .9 1.3 2.1 3.0 4.5 6.3	.98 3.0 4.3 6.9 9.8 14.8 20.7		
	8227† 2498 300V 80C	500 1000 2000	152.4 304.8 609.6	30.3 62.4 127.3	20 (7x28) [.97] 1 tinned copper 1 bare copper 9.46Ω/M' 31.04Ω/km	Polyethylene 240 6.10	330 8.38	1 tinned copper 2.7Ω/M' 8.86Ω/km 85% shield coverage	100	66%	15.5	50.9	1 10 20 50 100 200 400	.4 1.1 1.5 2.5 4.1 6.4 10.2	1.3 3.6 4.9 8.2 13.5 21.0 33.5		

Attachment No II



Variable Speed Drives & Controls

[Quick Tour](#) :: [Contact Us](#) :: [About Us](#) :: [Privacy Policy](#) ::

[Home](#) > [Products](#) > [ABB ACS550 AC Drives - 480V Ratings](#)

Friday, June 16, 2006

Call Toll Free (866) 492-9388

ABB ACS550 AC DRIVES

0.75 HP (.55 kW) to 100 HP (75 kW) @ 208 to 240V

1.0 HP (.75 kW) to 550 HP (355 kW) @ 380 to 480V

- [Overview](#)
- [Hardware Description](#)
- [ACS550 Standard Features / Available Options](#)
- [ACS550 Specifications](#)
- [230V Ratings \(prices\)](#)
- [380V Ratings \(prices\)](#)
- [480V Ratings \(prices\)](#)
- [Dimensions: ACS550 NEMA 1 R1 through R6 Frame Size](#)
- [Dimensions: ACS550 NEMA 12 R1 through R6 Frame Size](#)
- [Dimensions: ACS550-02 NEMA 1 R7 Frame Size](#)
- [Dimensions: ACS550-02 NEMA 1 R8 Frame Size](#)
- [Dimensions: ACS550-U2 NEMA 1 R7 & R8 Frame Size](#)

ABB ACS550 AC DRIVES

480V Ratings

3-phase supply- voltage 380, 400, 415, 440, 460 or 480V - Power ratings are valid at nominal voltage, 480V ^(4, 5)

Home
Products
Variable Frequency Drive
What is a VFD?
How to Maintain a VFD
Adjustable Speed Drives - Application Information
DC Variable Speed Drives
AC Variable Frequency Drives
ABB ACS 550 AC Drive
ABB DTC AC Drive (pdf)
ABB ACS 600 AC Drive
ABB ACS 800 AC Drive
ABB ACS 800 AC Drive (pdf)
ABB ACS 1000 AC Drive (pdf)
ABB Medium Voltage Softstarters
Control Techniques
Commander SK AC Drive
Saftronics GP10 AC Drives
Saftronics S10 AC Drives
Saftronics CV10 AC Drives
Saftronics VG10 AC Drives
Avtron - Adjustable Speed Drives and Drive Systems
Avtron - Speed and Length Measurement
Avtron - Tachs, Tachometers, Encoders, Rotary Pulse Generators
Magnetek - RVS-DX Digital Soft Starter
Magnetek - Reduced Voltage Soft Starters
Magnetek - Medium Voltage Soft Starters
VFD's and Cooling Towers
Spare Parts / Replacement Parts
PLC (Programmable Logic Controller)
RFQ (Request for Quote)
Recent Projects
Services
Contact Joliet Technologies
Ask a Professional
About Joliet Technologies
Information
FAQ (Frequently Asked Questions)
Visitor Survey - Help Us Help You
Privacy Policy
Copyright Notice
Site Map

Nominal Ratings ^(4, 5)

Type Code (UL Type 1 NEMA 1 ^(6,7,9))	Normal Duty (CT)		Heavy-duty (CT)		Frame Size
	(110% I _{2N})		(150% I _{2hd})		
	I _{2N} A ^(1,3)	P _N HP ⁽⁸⁾	I _{2hd} A ^(2,3)	P _{hd} HP ⁽⁸⁾	
Wall Mounted Drives					
ACS550-U1-03A3-4	3.3	1.5	2.4	1	R1
ACS550-U1-04A1-4	4.1	2	3.3	1.5	R1
ACS550-U1-06A9-4	6.9	3	5.4	2	R1
ACS550-U1-08A8-4	8.8	5	6.9	3	R1
ACS550-U1-012A-4	11.9	7.5	8.8	5	R1
ACS550-U1-015A-4	15.4	10	11.9	7.5	R2
ACS550-U1-023A-4	23	15	15.4	10	R2
ACS550-U1-031A-4	31	20	23	15	R3
ACS550-U1-038A-4	38	25	31	20	R3
ACS550-U1-044A-4	44	30	38	25	R4
ACS550-U1-059A-4	59	40	44	30	R4
ACS550-U1-072A-4	72	50	59	40	R4
ACS550-U1-078A-4	77	60	65	50	R4
ACS550-U1-096A-4	96	75	77	60	R5
ACS550-U1-124A-4	124	100	96	75	R6
ACS550-U1-157A-4	157	125	124	100	R6

Information Provided by:
ABB Inc.
Automation Technologies
Low Voltage Drives
16250 W. Glendale Drive
New Berlin, WI 53151
Phone: (800) 752-0696

Ratings, types and voltages

Type code

This is the unique reference number that clearly identifies the drive by mounting configuration, power rating and voltage. Once you have selected the type code, the frame size can be used to determine the drives dimensions, shown on the next page.

Voltages

The ACS550 is available in three voltage ranges:

- 2 = 208 - 240V
- 4 = 380 - 480V
- 6 = 500 - 600V

Notes

- 1 I_{2N} : continuous base current with 110% overload for 1 minute / 10 minutes.
- 2 I_{2hd} : continuous base current with 150% overload for 1 minute / 10 minutes.
- 3 180% I_{hd} continuous base current available for 2 seconds / 1 minute.
- 4 The rated current of the ACS550 must be greater than or equal to the rated motor current to achieve the rated motor power given in the table.
- 5 All -U1 models come with a conduit box and advanced control panel as standard.
- 6 Horsepower is based on NEMA motor ratings for most 4-pole motors (1800 rpm). Check motor nameplate current for compatibility.
- 7 All 230V product can be operated on 230V single-phase power, using a de-rate of the output current of 50%.
- 8 All -U2 models come standard with US conduit openings, top entry / top exit, common mode filter for drives larger than 200 HP, fused disconnect and extended enclosure with advanced control panel.

RBB

Model	208-240V	380-480V	500-600V	Frame	
ACS550-U1-04A6-2	4.6	1.0	3.5	0.75	R1
ACS550-U1-06A6-2	6.5	1.5	4.6	1.0	R1
ACS550-U1-07A5-2	7.5	2.0	6.6	1.5	R1
ACS550-U1-012A-2	11.8	3.0	7.5	2	R1
ACS550-U1-017A-2	18.7	5.0	11.8	3	R1
ACS550-U1-024A-2	24.2	7.5	16.7	5	R2
ACS550-U1-031A-2	30.8	10	24.2	7.5	R2
ACS550-U1-046A-2	46.2	15	30.8	10	R3
ACS550-U1-059A-2	59.4	20	46.2	15	R3
ACS550-U1-075A-2	74.8	25	59.4	20	R4
ACS550-U1-088A-2	88	30	74.8	25	R4
ACS550-U1-114A-2	114	40	88	30	R4
ACS550-U1-143A-2	143	50	114	40	R6
ACS550-U1-178A-2	178	60	143	50	R6
ACS550-U1-221A-2	221	75	178	60	R6
ACS550-U1-248A-2	248	100	192	75	R6
ACS550-U1-03A3-4	3.3	1.5	2.4	1	R1
ACS550-U1-04A1-4	4.1	2	3.3	1.5	R1
ACS550-U1-06A9-4	6.9	3	5.4	2	R1
ACS550-U1-08A8-4	8.8	5	6.9	3	R1
ACS550-U1-012A-4	11.9	7.5	8.8	5	R1
ACS550-U1-015A-4	15.4	10	11.9	7.5	R2
ACS550-U1-023A-4	23	15	15.4	10	R2
ACS550-U1-031A-4	31	20	23	15	R3
ACS550-U1-038A-4	38	25	31	20	R3
ACS550-U1-045A-4	44	30	38	25	R3
ACS550-U1-059A-4	59	40	44	30	R4
ACS550-U1-072A-4	72	50	59	40	R4
ACS550-U1-078A-4	77	60	65	50	R4
ACS550-U1-097A-4	96	75	77	60	R4
ACS550-U1-125A-4	124	100	96	75	R6
ACS550-U1-157A-4	157	125	124	100	R6
ACS550-U1-180A-4	180	150	158	125	R6
ACS550-U2-196A-4	196	150	162	125	R7
ACS550-U2-245A-4	245	200	192	150	R7
ACS550-U2-316A-4	316	250	248	200	R8
ACS550-U2-368A-4	368	300	302	250	R8
ACS550-U2-414A-4	414	350	368	300	R8
ACS550-U2-486A-4	486	400	414	350	R8
ACS550-U2-526A-4	526	450	477	400	R8
ACS550-U2-602A-4	602	500	515	450	R8
ACS550-U2-645A-4	645	550	590	500	R8
ACS550-U1-02A7-6	2.7	2	2.4	1.5	R2
ACS550-U1-03A9-6	3.9	3	2.7	2.0	R2
ACS550-U1-06A1-6	6.1	5	3.9	3.0	R2
ACS550-U1-09A0-6	9	7.5	6.1	5.0	R2
ACS550-U1-011A-6	11	10	9	7.5	R2
ACS550-U1-017A-6	17	15	11	10	R2
ACS550-U1-022A-6	22	20	17	15	R3
ACS550-U1-027A-6	27	25	22	20	R3
ACS550-U1-032A-6	32	30	27	25	R4
ACS550-U1-041A-6	41	40	32	30	R4
ACS550-U1-052A-6	52	50	41	40	R4
ACS550-U1-062A-6	62	60	52	50	R4
ACS550-U1-077A-6	77	75	62	60	R6
ACS550-U1-098A-6	99	100	77	75	R6
ACS550-U1-125A-6	125	125	99	100	R6
ACS550-U1-144A-6	144	150	125	125	R6

Technical specification

Input power connection	
Voltage and power range	3-phase, 208 to 240 V, +10/-15%, 0.75 - 100Hp 3-phase, 380 to 480 V, +10/-15%, 1 - 650Hp 3-phase, 500 to 600V, +10/-15%, 1.5 - 150Hp
Frequency	48 to 63 Hz
Power factor	0.98

Motor connection	
Voltage	3-phase, from 0 to U_{SUPPLY}
Frequency	0 to 600 Hz
Continuous loading capability	Rated output current I_{2N} <small>(constant torque at a max ambient temperature of 40°C)</small>
Overload capacity	At normal use $1.1 \times I_{2N}$ for 1 minute every 10 minutes At heavy-duty use $1.5 \times I_{2N}$ for 1 minute every 10 minutes Always $1.8 \times I_{2N}$ for 2 seconds every 60 seconds <small>(at a max. ambient temperature of 40°C)</small>
Switching frequency	Standard: Default 4 kHz Selectable: 0.75 - 150Hp: 1 kHz, 4 kHz, 8 kHz, 12 kHz up to 650Hp: 1 kHz, 4 kHz
Acceleration time	0.1 to 1800 s
Deceleration time	0.1 to 1800 s

Environmental limits	
Ambient temperature	-15 to 40°C (5 to 104°F) 40 to 50°C (104 to 122°F)
Altitude	No frost allowed f_{max} , 4 kHz, F_n and I_2 derated to 90%
Output current	Rated current available at 0 to 1000 m (3300 ft) reduced by 1% per 100 m over 1000 m (3300 ft) to 2000 m (6600 ft)
Relative humidity	lower than 95% (without condensation)
Protection class	UL Type 1 or 12 (NEMA 1 or NEMA 12)
Enclosure color	NCS 1502-Y, RAL 9002, RMS 420
Contamination levels	No conductive dust allowed
Transportation	IEC60721-3-1, class 2C2 (chemical gases), Class 2S2 (solid particles)
Storage	IEC60721-3-2, Class 1C2 (chemical gases), Class 1S2 (solid particles)
Operation	IEC60721-3-3, Class 3C2 (chemical gases), Class 3S2 (solid particles)

Programmable control connections	
Two analog inputs	
Voltage signal	0 (2) to 10 V, $R_{in} > 312 \text{ k}\Omega$ single-ended
Current signal	0 (4) to 20 mA, $R_{in} = 100 \Omega$ single-ended
Potentiometer reference value	10 V $\pm 2\%$ max, 10 mA, $R < 10 \text{ k}\Omega$
Maximum delay	12...32 ms
Resolution	0.1%
Accuracy	$\pm 1\%$
Two analog outputs	
Accuracy	0 (4) to 20 mA, load $< 500 \Omega$ $\pm 3\%$
Auxiliary voltage	24 V DC $\pm 10\%$, max. 250 mA
Six digital inputs	
Input impedance	12 V... 24 V DC with internal or external supply, PNP and NPN
Maximum delay	2.4 k Ω 5 ms $\pm 1\text{ms}$
Three relay outputs	
Maximum switching voltage	250 V AC/50 V DC
Maximum switching current	6 A/30 V DC; 1500 V A/230 V AC
Maximum continuous current	2 A rms
Serial communication	
RS 485	Modbus protocol

Motor Control	
Speed Control	
Static Accuracy	20% of motor nominal slip
Dynamic Accuracy	$< 1\%$ sec with 100% torque step
Motor Control	
Torque Step Rise Time	$< 10\text{ms}$ with nominal torque
Non-Linearity	$\pm 5\%$ with nominal torque

Product compliance	
240V products:	UL, cUL, CSA and CE approvals
480V products:	UL, cUL, CSA and CE approvals
600V products:	UL, cUL, and CSA approvals
Quality assurance system: ISO 9001 and Environmental system: ISO 14001	

EMC (480V products, according to FN61800-3)

1st environment restricted distribution for frame sizes R3, R4 with 75 m motor cables and for frame sizes R1, R2, R5, R6 with 100 m motor cables.
2nd environment unrestricted distribution with 100 m cable as standard.
For longer motor cable lengths, external EMC filters are available on request.



Dimension Sheet
29-170H

October 1997
Mailed to: E. D. C/23-100A

**Series C[®]
HMCP
Motor Circuit
Protectors
3-600 Amperes**

<u>Breaker Description</u>	<u>Page</u>
F-Frame	1
J-Frame	3
K-Frame	5
L-Frame	7

[How to Order](#) | [View Product List](#) | [Help](#) | [Catalog Login](#)

Find A Product

Search by Part or UPC Number in:

Entire Catalog

-OR-

Search Entire Catalog
Using Keywords:

Begins With ...

[Return to Previous Page](#)

Series C Motor Circuit Protector

Related Information

Series C Motor Circuit Protector, Type HMCF, F-Frame, Low Magnetic, 3 Poles, 50 AMP, 600 VAC 250 VDC, 80 - 120 Mag. Trip

Product information, manuals
and drawings.

[Add Quantity](#)

[To Product List](#)

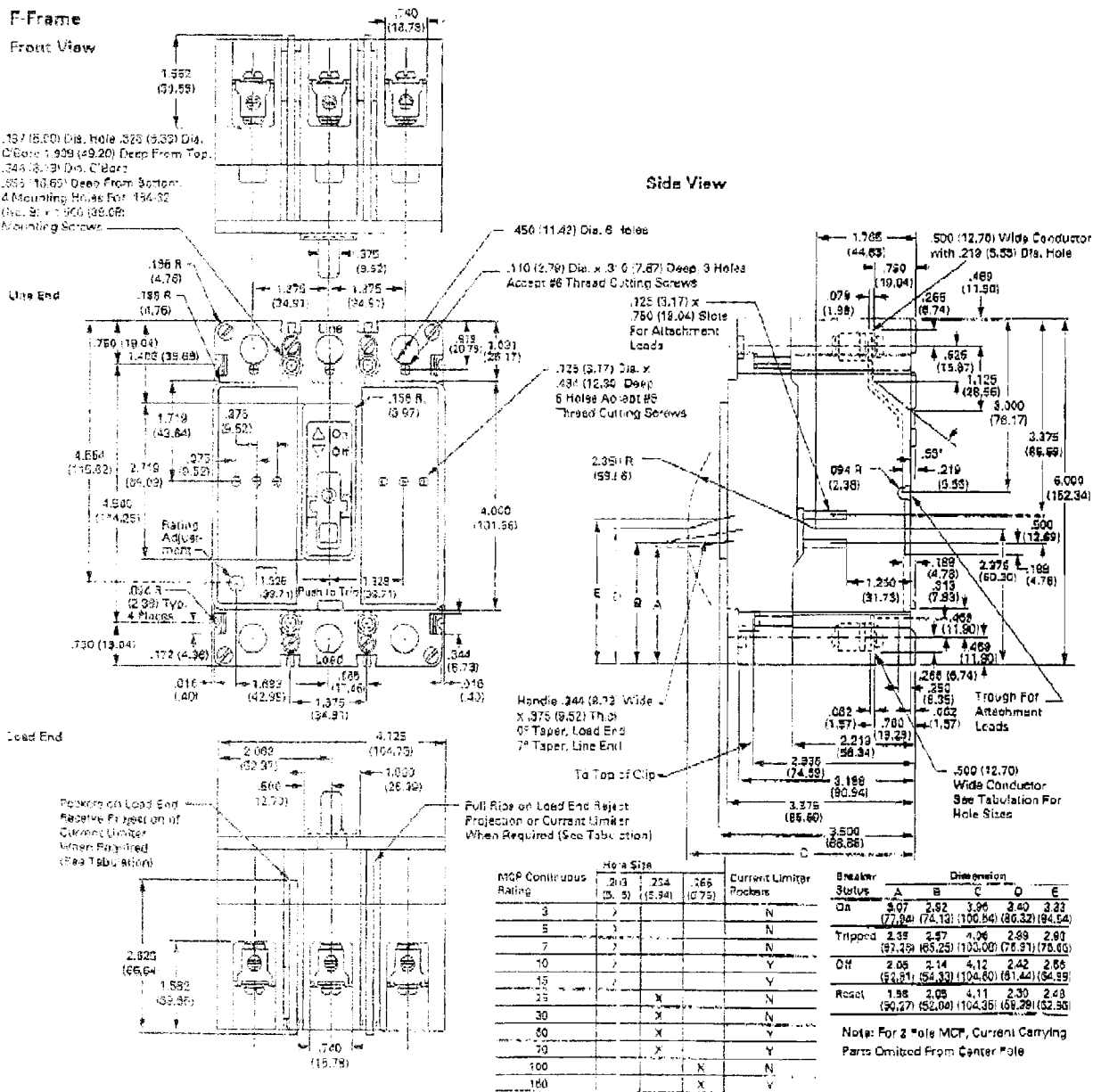
Catalog Number:	HMCP050G2
Style Number:	6601096G27
UPC Number:	00786679130900
Product Code:	3081D
Order in Multiples of:	1
Usually Ships:	1-3 Working Days
Weight:	4.15 lbs
Dimensions:	7.5 in. x 5 in x 4.9 in
Regulatory Compliance:	
Warranty Information:	1 Year
Circuit Protector Type:	HMCP
Size:	F-Frame (3 - 150 AMP)
Type:	Low Magnetic
Number of Poles:	3
Ampere Rating (AMP):	50
Voltage Rating:	600 VAC, 250 VDC
Motor Full Load Current Amperes Range (FLA):	
Trip Setting (AMP):	80 - 120
NEMA Starter Size:	
Options:	
Catalog Notes:	

For IEC applications, actual trip levels are approximately 40% high than values shown. Comes with line and load steel body terminals (3T100FB).

[Privacy Policy](#) | [How Can We Improve This Page?](#) | [Terms & Conditions](#)
Copyright © 2003 Eaton Corporation,
All Rights Reserved

October 1997
Mailed to: E. D. C/29-100A

Series C[®] HMCP Motor Circuit Protectors 3-600 Amperes



Reproduced from drawing 169051

Dimensions in parentheses in millimeters

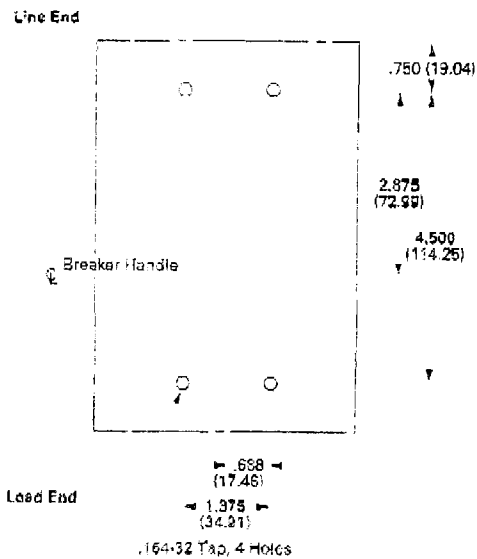
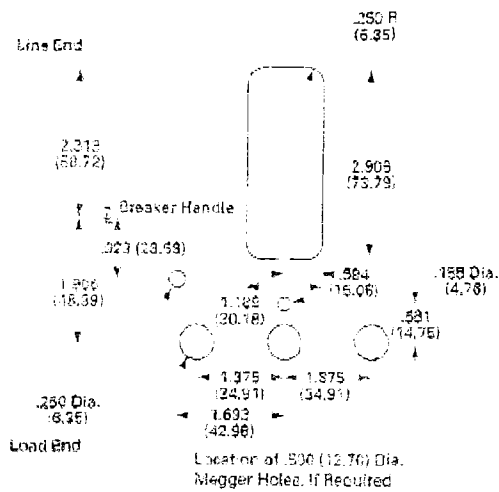


Series C HMCP Motor Circuit Protectors, 3-600 Amperes

F-Frame

Front Cover Cutout

Drilling Plans



Reproduced from drawing 1480054

Dimensions in parentheses in millimeters

Cutler-Hammer

Wardencloffe & Cutler-Hammer Products
Five Parkway Center
Pittsburg, Pennsylvania U.S.A. 15220



Cutler-Hammer

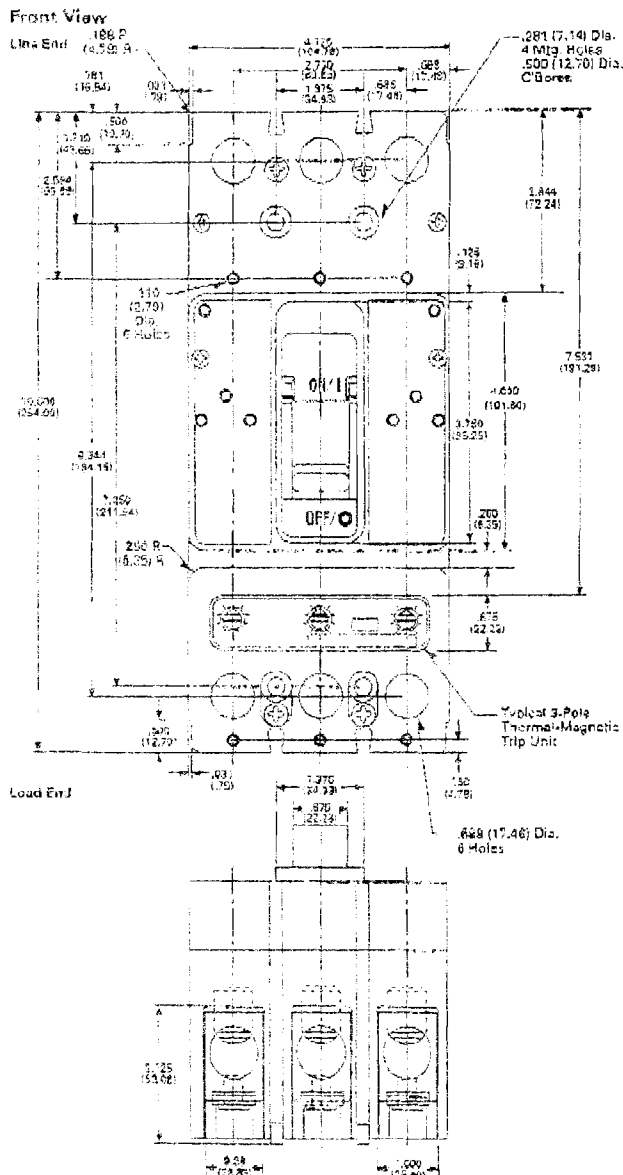
Dimension Sheet
29-170H

Page 3

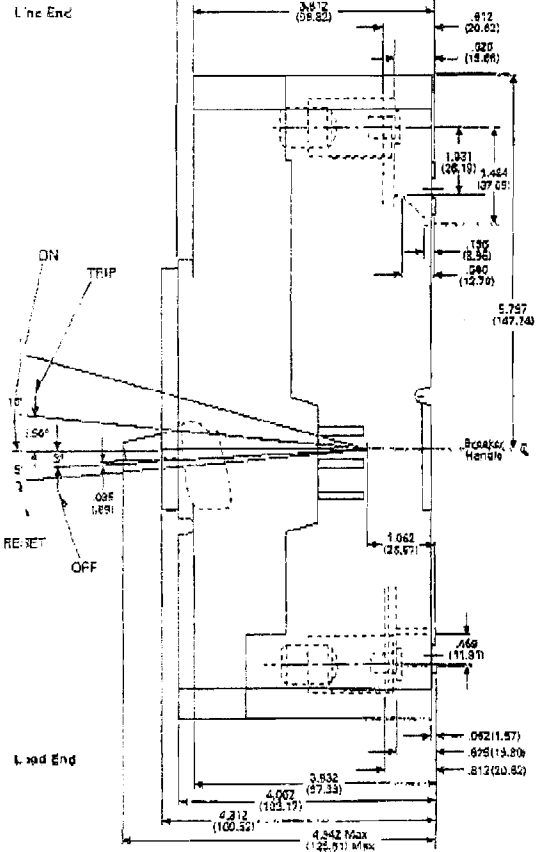
October 1997
Mailed to: E. D. C/29-100A

Series C® HMCP Motor Circuit Protectors 3-600 Amperes

J-Frame



Side View



Reproduced from drawings 1491067 and 1491067

Dimensions in parentheses in millimeters

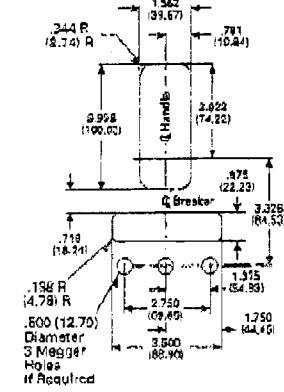
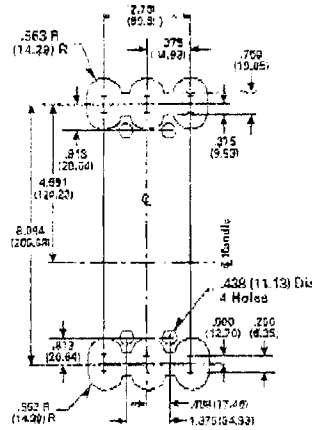
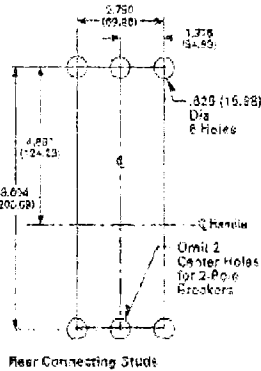
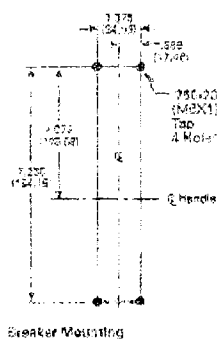




Series C HMCP Motor Circuit Protectors, 3-600 Amperes

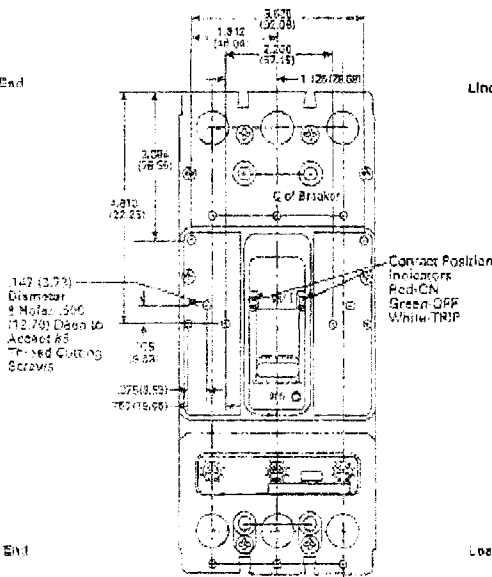
J-Frame

Drilling Plans

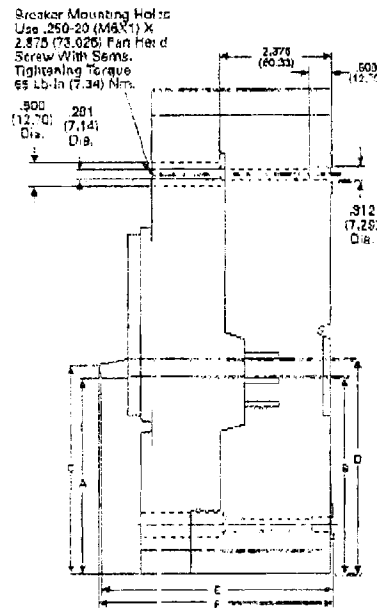


Breaker Shown in OFF Position

Line End



Line End



Load End

Load End

Reproduced from Drawings 149126F and 149126G

Dimensions in parentheses in millimeters

Breaker Status	Dimension						Hdl. Oper. Force
	A	B	C	D	E	F	
On	5.29 (132.16)	6.12 (155.59)	6.54 (166.72)	5.49 (139.45)	4.77 (121.56)	4.72 (119.59)	32 Lb. (142.3 Nmi)
Tripped	4.52 (114.87)	4.71 (119.03)	5.16 (130.64)	5.10 (128.54)	4.87 (123.76)	4.85 (123.13)	
Off	4.32 (109.15)	4.36 (110.32)	4.32 (109.53)	4.49 (113.63)	4.91 (124.71)	4.89 (123.78)	22 Lb. (97.9 Nmi)
Reset	3.91 (99.31)	3.93 (100.58)	4.21 (106.81)	4.36 (110.74)	4.90 (124.46)	4.89 (123.73)	28 Lb. (126.9 Nmi)

Cutler-Hammer

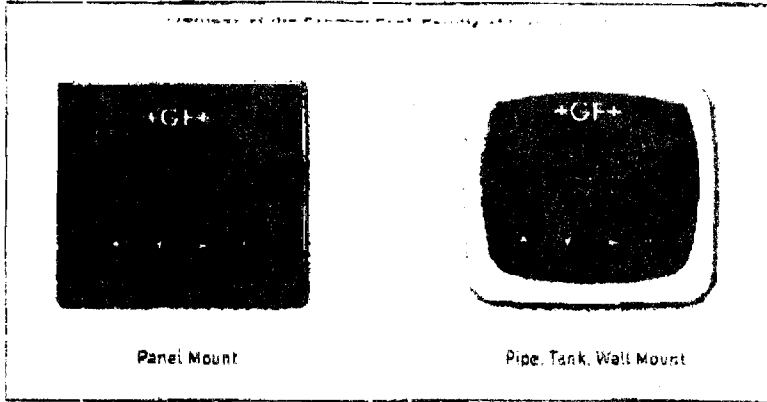
Westinghouse & Cutler-Hammer Products
Five Parkway Center
Pittsburgh, Pennsylvania, U.S.A. 15220



850-81110
850-897-6555

+GF+

Signet 8750 pH/ORP Transmitters



Features
Automatic temperature compensation

- Temperature display in °C or °F
- Hold and simulate functions
- Relay options available
- Output scalability
- Optional dual output
- NEMA 4X/IP65 enclosure with self-healing window
- EasyCal option available

Description




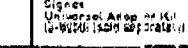



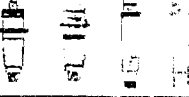

The Signet 8750 pH/ORP Transmitter is designed for broad application and ease of setup and use. The unit auto-configures for either pH or ORP use when connected to Signet pH or ORP electrodes. Choice of mounting options allow users to customize their installation for particular applications.

The EasyCal menu features automatic buffer recognition for mistake-proof pH or ORP electrode calibrations. Intuitive software and the four button keypad arrangement make it easy to access important information such as pH or ORP, mV input, temperature, calibration, relay set-up menus and more.

Applications

- Neutralization Systems
- Heavy Metals Recovery
- Plating Control
- Scrubber Control
- Pool and Spa Control
- Environmental Study
- Water Treatment
- Water Quality Monitoring
- Waste Treatment
- Disinfection

System Overview

In-Line Sensor Installation		Submersible Sensor Installation
Panel Mount Signet 8750 pH/ORP Instrument 	Pipe, Tank, Wall Mount Signet 8750 pH/ORP Instrument 	Panel, Pipe, Tank, Wall Mount Signet 8750 pH/ORP Instrument 
Signet Universal Adapter Kit (sold separately) 		3/4" or 1" diameter or conduct with 3/4" UN, NPT or ISO 7/16-3/4 threads 
Signet 2720 and 2766 Preamplifier (sold separately) 		Signet 2720 and 2766 Preamplifier (sold separately) 
Signet pH/ORP electrodes (sold separately) 2717 2768 2716 2776 2718 2769 2717 2777 		Signet pH/ORP electrodes (sold separately) 2714 2750 2744 2794 2715 2751 2745 2795 2716 2752 2746 2796 2717 2753 2747 2797 
Signet Fittings* (sold separately) or customer supplied fittings (see individual electrode sheets for more info)		



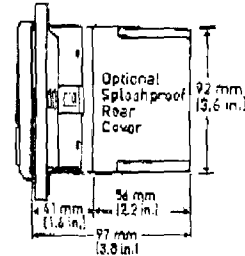
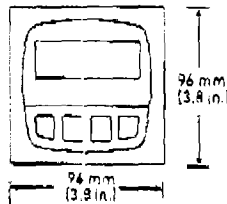
* See Fittings Section for more information

www.gfsignet.com

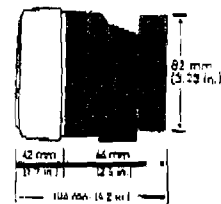
+GF+

Dimensions

3-8750-XP Panel Mount



Field version with Universal Mounting Kit



Model 8750

Ordering Information:

- 1) For panel version, cutout should be 92 x 92 mm (3.62 x 3.62 in.)
- 2) To mount the panel version on a wall, use the heavy duty wall mount bracket.
- 3) An optional splashproof rear cover can be ordered separately if needed - panel mount version only.
- 4) Use the universal mounting kit with the field mount instrument to mount to a pipe, tank or wall.
- 5) Order RC filter kits to protect relays from voltage spikes.

Please refer to Wiring, Installation, and Accessories sections for more information.

www.gfsignet.com

Specifications

General

Accuracy: ±0.03 pH, ±2 mV ORP

Display:

- Alphanumeric 2 x 16 LCD
- Contrast: User selectable, 5 levels

Material

- Case: PBT
- Panel case gasket: Neoprene
- Window: Polyurethane coated polycarbonate
- Keypad: Sealed 4-key silicone rubber

Electrical

Power:

- 12 to 24 VDC ±10% regulated
- (-) 21 mA max.
- (-2) 220 mA max.
- (-3) 60mA max.

Electrode input range:

- pH: 0 to 14 pH
- Temp: 3K Ba.co -25°C to 120°C (-13°F to 248°F)
- ORP: -2000 to +2000 mV, isolated (10KΩ I.D. resistance T+, T-)

Current output:

- 4 to 20 mA, isolated, passive, fully adjustable and reversible
- Max. loop impedance:
 - 50Ω max. @ 12 V
 - 325Ω max. @ 18 V
 - 600Ω max. @ 24 V
- Update rate: 0.5 seconds
- Accuracy: ±0.03 mA @ 25°C, 24 V

Electrical (continued)

Relay output:

- Mechanical SPDT contacts: Hi, Lo, Pulse, Off
- Maximum voltage rating: 5 A @ 30 VDC, or 5 A @ 250 VAC resistive load
- Hysteresis: User-adjustable Max 400 pulses/min.
- Open-collector output: Hi, Lo, Pulse, Off
 - Open-collector, optically isolated, 50 mA max. sink, 30 VDC max. pull-up voltage.
 - Hysteresis: User-adjustable Max. 400 pulses/min.

Environmental

- Enclosure rating: NEMA 4X/IP68 front
- Operating temperature: -10°C to 70°C (14°F to 158°F)
- Storage temperature: -15°C to 80°C (5°F to 176°F)
- Relative humidity: 0 to 95%, non-condensing

Shipping Weight: 0.6 kg (1.3 lb.)

Standards and Approvals

- CE, UL listed
- Manufactured under ISO 9001:2000 for Quality and ISO 14001:2004 for Environmental Management

Ordering Information

3-8750	pH/ORP Transmitter
-1	One input with 4 to 20 mA output and one open collector; uses 2 wire power
-2	One input with 4 to 20 mA output and two relays; uses 4 wire power
-3	One input with two 4 to 20 mA outputs and 2 open collectors; uses 4 wire power
	Field or panel mount - Choose one
-	Field mount for pipe, wall, or tank mounting
P	Panel mount; including mounting bracket and panel gasket

Mfr. Part No.	Code	Mfr. Part No.	Code
3-8750-1	159 000 053	3-8750-2P	159 000 056
3-8750-1P	159 000 054	3-8750-3	159 000 057
3-8750-2	159 000 055	3-8750-3P	159 000 058

Accessories and Replacement Parts

Mfr. Part No.	Code	Description
Mounting		
3-8050	159 000 184	Universal mounting kit
3-8050.392	159 000 640	Model 230 retrofit adapter
3-8050.395	159 000 186	Splashproof rear cover
3-0000.596	159 000 641	Heavy duty wall mount bracket (for panel mount only)
3-5000.598	198 840 225	Surface Mount Bracket
Liquid tight connectors		
3-9000.392	159 000 366	Liquid tight connector kit for rear cover (3 connectors)
3-9000.392-1	159 000 839	Liquid tight connector kit, NPT (1 piece)
3-9000.392-2	159 000 841	Liquid tight connector kit, PG13.5 (1 piece)
Other		
3-8050.396	159 000 617	RC Filter kit (for relay use), 2 per kit
3-0700.390	198 864 403	pH buffer kit

Liquid Level Probes





Our Experience - Yo

Home | About Us | Products | Markets/Applications | Literature | Order Status | Contact Us | Customer S

Home > Series 3R / Series 3T Ordering Information

Series 3R / Series 3T Ordering Information

How To Order:

To order this product, simply select from the drop boxes below to construct your product code. The pricing and lead time will be displayed on a new page; enter the quantity you need and the item will be added to your shopping cart.



1 - Series *	3R - Series 3R
2 - Length (Feet) *	3 - 3 feet
3 - Probe Material *	C - 316 Stainless Steel
4 - Sheathing Heat Shrink *	4 - PVC
5 - Options	B - Probe with 1/4"-20NC-2A thread at both ends

* Selection Required

Notes:

1. To maintain maximum rigidity, **Gems recommends that Series 3R/3T probes not exceed 5' in length.** In these cases strongly consider the use of Series 3W or 3Y Wire Suspended probes.
2. If it is absolutely necessary to go with >5' probes, shipping / installation issues can be minimized by coupling together two shorter probes. When using this approach, order one or more probes threaded at both ends (eg 3R4C0B), one standard probe (eg 3R4C0) and one 316SS coupling (P/N 7760551).
3. Contact your representative for custom lengths.
4. For probe materials other than stainless steel, add one week to lead time.

[Create Part Number](#)

Home | Contact Us | My Products | Products | Terms & Conditions | Privacy Policy

Call Toll Free: 1.800.378.1600 or Email: info@gemssensors.com



ISO 9001 Certified

2006© Gems Sensors & Controls. All rights reserved



Our Experience - Yo

Home | About Us | Products | Markets/Applications | Literature | Order Status | Contact Us | Customer S

Home > Add to Order

Step 1 Of 6 - Add To Order

- To add this item to your order, enter the quantity required and any special order instructions then select the 'Add to Order' button. Your cart will be displayed with the new item added.
- If you do not want to add this item to your cart, select the 'Cancel' button.

Part Number:	3R3C4B
Description:	Series 3R, 3 feet ^{→ 30"} 316 Stainless Steel, PVC, Probe with 1/4"-20NC-2A thread at both ends
Quantity:	1 pieces
List Price:	\$60.00
Lead Time:	5 Days
Special Requirements:	

Cancel Add To Order

Home | Contact Us | My Products | Products | Terms & Conditions | Privacy Policy

Call Toll Free: 1.800.378.1600 or Email: info@gemssensors.com

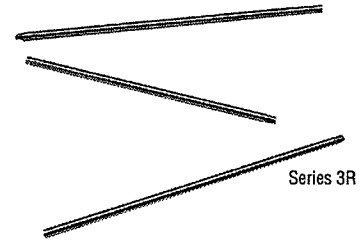


ISO 9001 Certified
2006© Gems Sensors & Controls. All rights reserved

Series 3R/3T – General Purpose Probes

- ▶ Metallic Rods
- ▶ Available in Many Materials for Various Requirements
- ▶ Adaptable for Various Fittings

For general purpose use, Series 3R probes are metallic rods with threaded ends that screw into a fitting that extends vertically down into the liquid. Available in a variety of materials for different applications. 3T tapered rods are also available.



Specifications

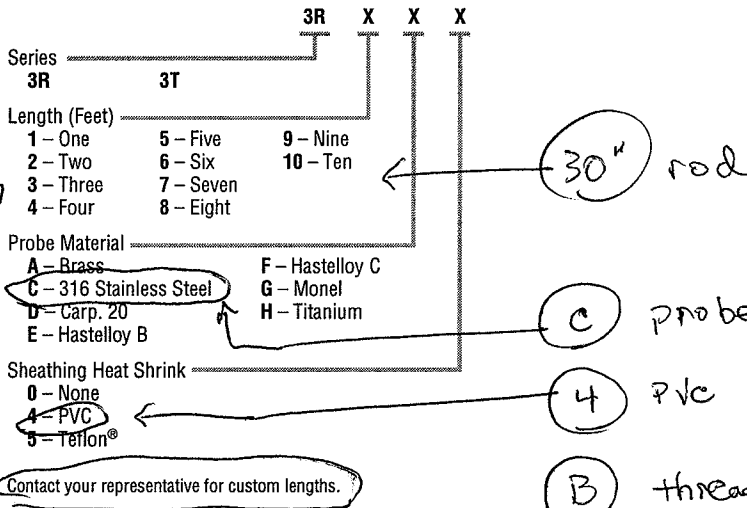
Style	
Series 3R	1/4" (.64 cm) threaded rod
Series 3T	1/4" (.64 cm) tapered rod
Material	Brass, Hastelloy B, Hastelloy C, Monel, 316 stainless steel, titanium, Carp. 20
Sheathing (optional)	PVC heat shrink (200°F), Teflon® heat shrink (350°F)

Applications

- 3R: For use with Series 3E, 3F, 3G, 3B fittings
- 3T: For use with Series 3G and other custom configurations

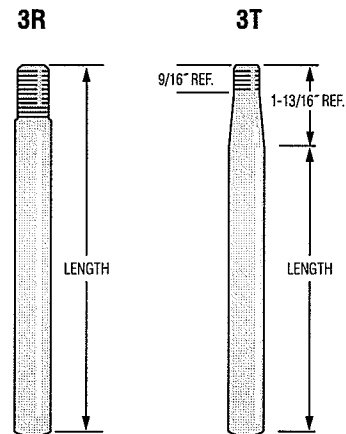
How to Order

Use the **Bold** characters from the chart below to construct a product code.



Note: Long lengths can be coupled to facilitate shipping and installation.

Dimensions



WARRICK CONDUCTIVITY SENSORS

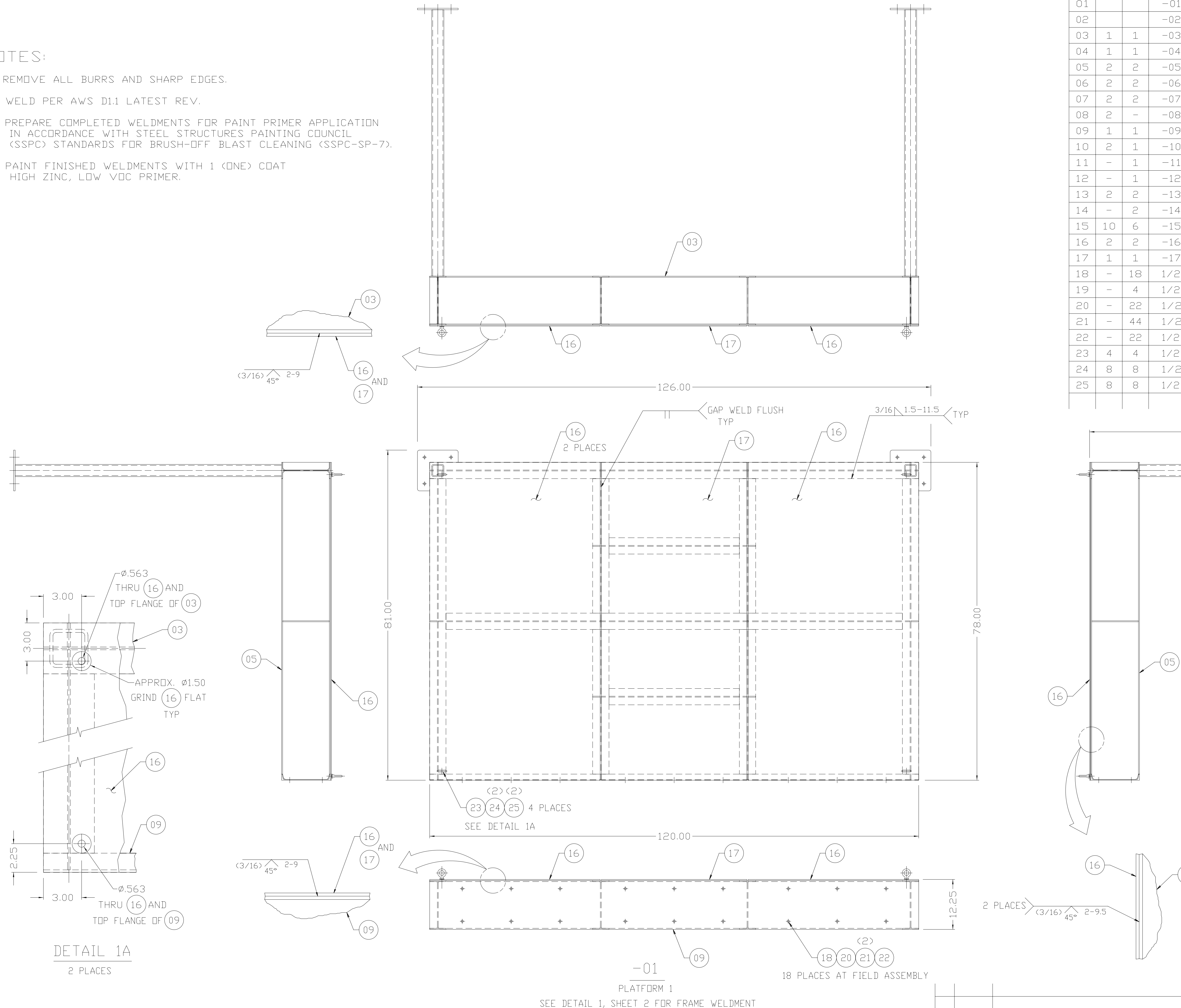
Steel Platform Assembly



NOTES:

1. REMOVE ALL BURRS AND SHARP EDGES.
2. WELD PER AWS D1.1 LATEST REV.
3. PREPARE COMPLETED WELDMENTS FOR PAINT PRIMER APPLICATION IN ACCORDANCE WITH STEEL STRUCTURES PAINTING COUNCIL (SSPC) STANDARDS FOR BRUSH-OFF BLAST CLEANING (SSPC-SP-7).
4. PAINT FINISHED WELDMENTS WITH 1 (ONE) COAT HIGH ZINC, LOW VOC PRIMER.

ITEM	-01	-02	DWG / PART NO.		DESCRIPTION
01			-01		WELDMENT, PLATFORM 1
02			-02		WELDMENT, PLATFORM 2
03	1	1	-03		W12 X 16 X 120.00
04	1	1	-04		W12 X 16 X 115.66
05	2	2	-05		W12 X 16 X 75.58
06	2	2	-06		W12 X 16 X 36.66
07	2	2	-07		W12 X 16 X 38.58
08	2	-	-08		W12 X 16 X 35.66
09	1	1	-09		MC12 X 10.6 X 120.00
10	2	1	-10		3.00 X 3.00 X .25W X 65.38
11	-	1	-11		3.00 X 3.00 X .25W X 58.62
12	-	1	-12		3.00 X 3.00 X .25W X 6.00
13	2	2	-13		PL .375 X 10.00 X 10.00
14	-	2	-14		PL .375 X 7.00 X 7.00
15	10	6	-15		PL .250 X 11.41 X 1.82
16	2	2	-16		FLOOR PL .250 X 41.84 X 78.00
17	1	1	-17		FLOOR PL .250 X 35.69 X 78.00
18	-	18	1/2-13 UNC X 1.50	SS 304	BOLT, HEX HD.
19	-	4	1/2-13 UNC X 1.75	SS 304	BOLT, HEX HD.
20	-	22	1/2"	SS 304	LOCKWASHER, SPLIT
21	-	44	1/2"	SS 304	WASHER, FLAT
22	-	22	1/2-13 UNC	SS 304	NUT, HEX
23	4	4	1/2-13 UNC	FORGED STEEL	EYEBOLT, SHOULDER
24	8	8	1/2"	A307	WASHER, FLAT
25	8	8	1/2-13 UNC	A307	NUT, HEX



APPROVAL

PLEASE REVIEW THIS DRAWING, CHECK THE APPROPRIATE BOX, THEN SIGN AND RETURN ONE COPY TO VERSACO MANUFACTURING, INC.

APPROVED AS SUBMITTED.

APPROVED AS MARKED.

NAME: _____ DATE: _____

TITLE: _____

VERSACO MANUFACTURING, INC.

550 Luchessa Avenue
Gilroy, Calif 95020
(408) 848-2880
FAX 848-5201

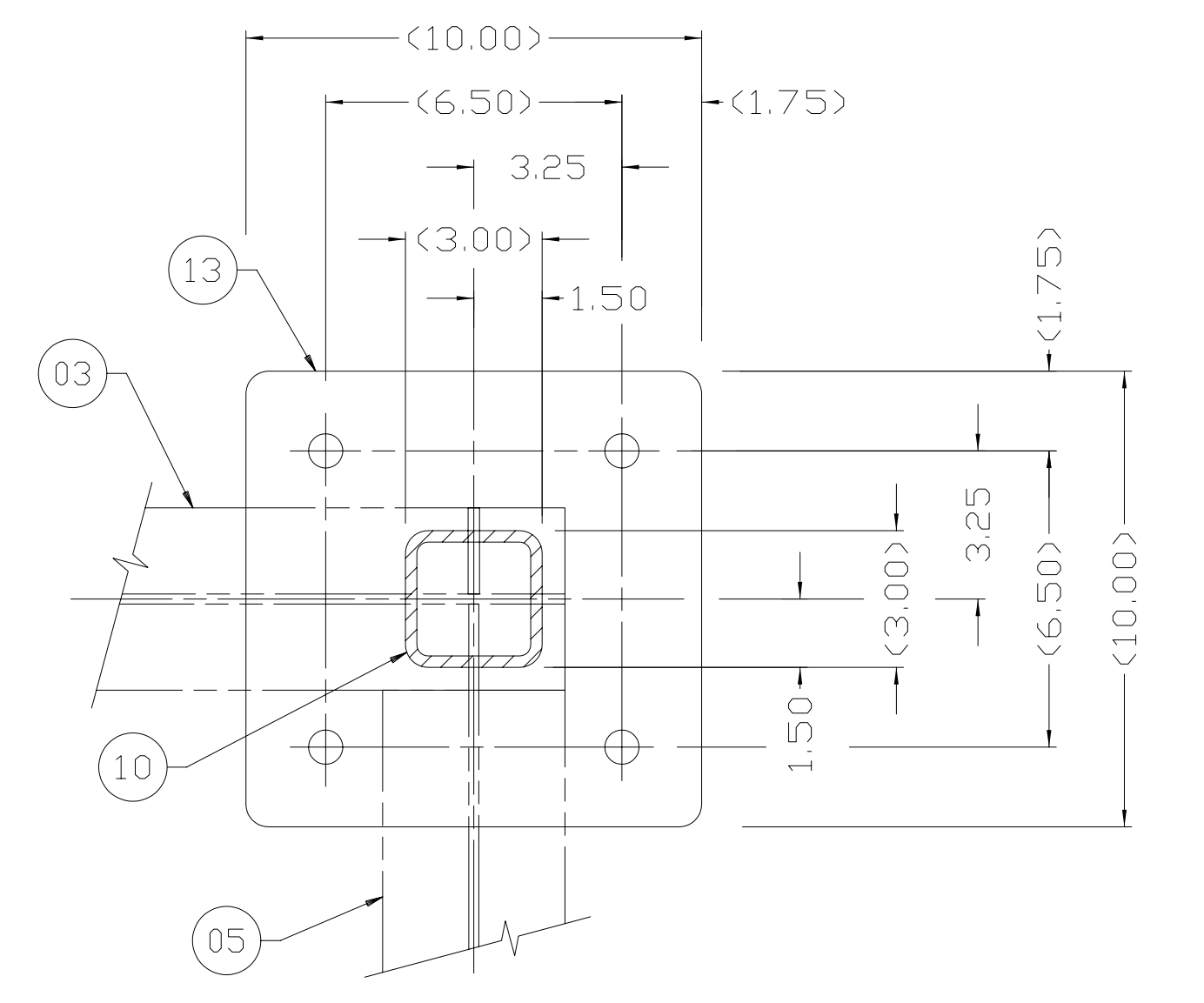
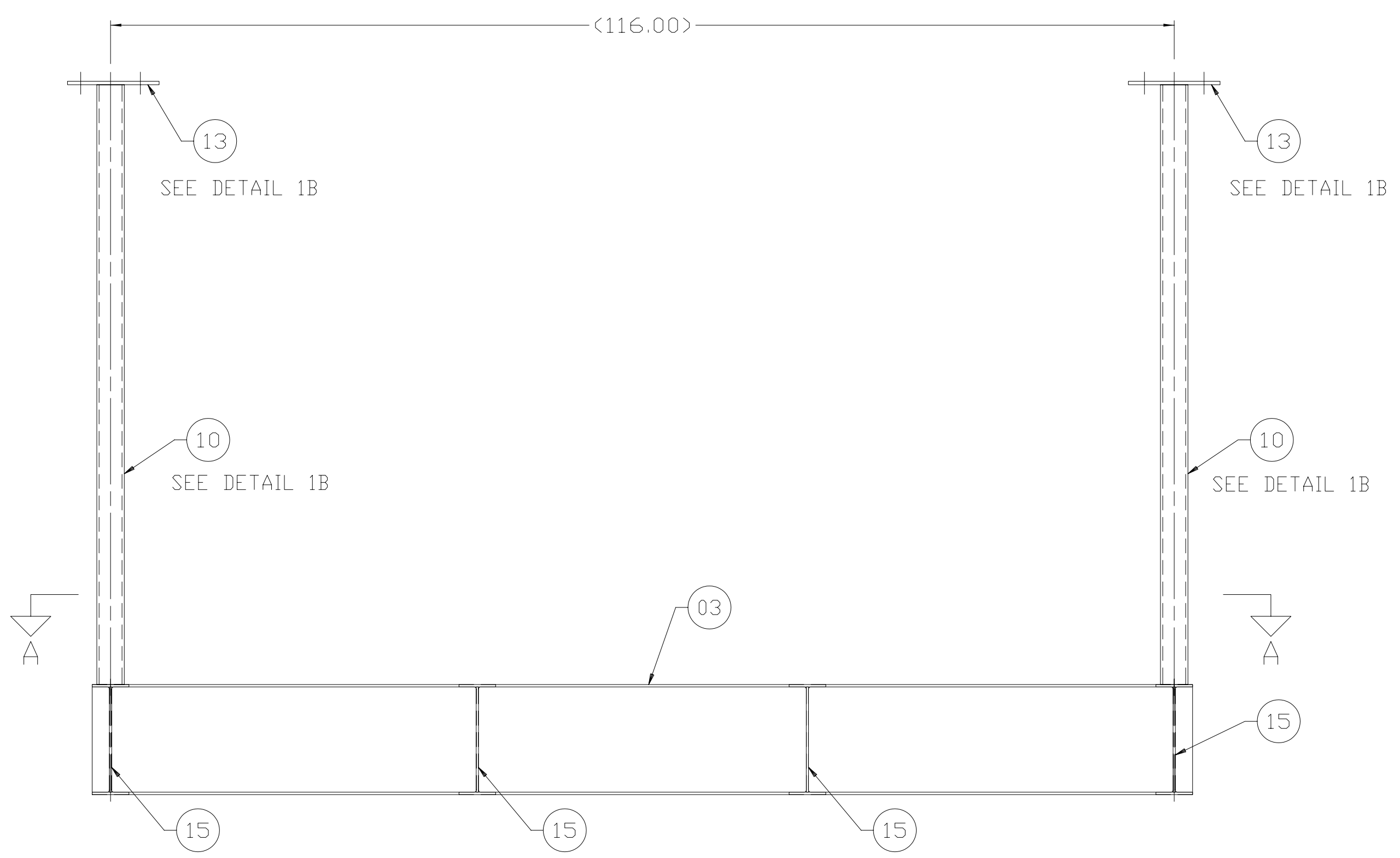
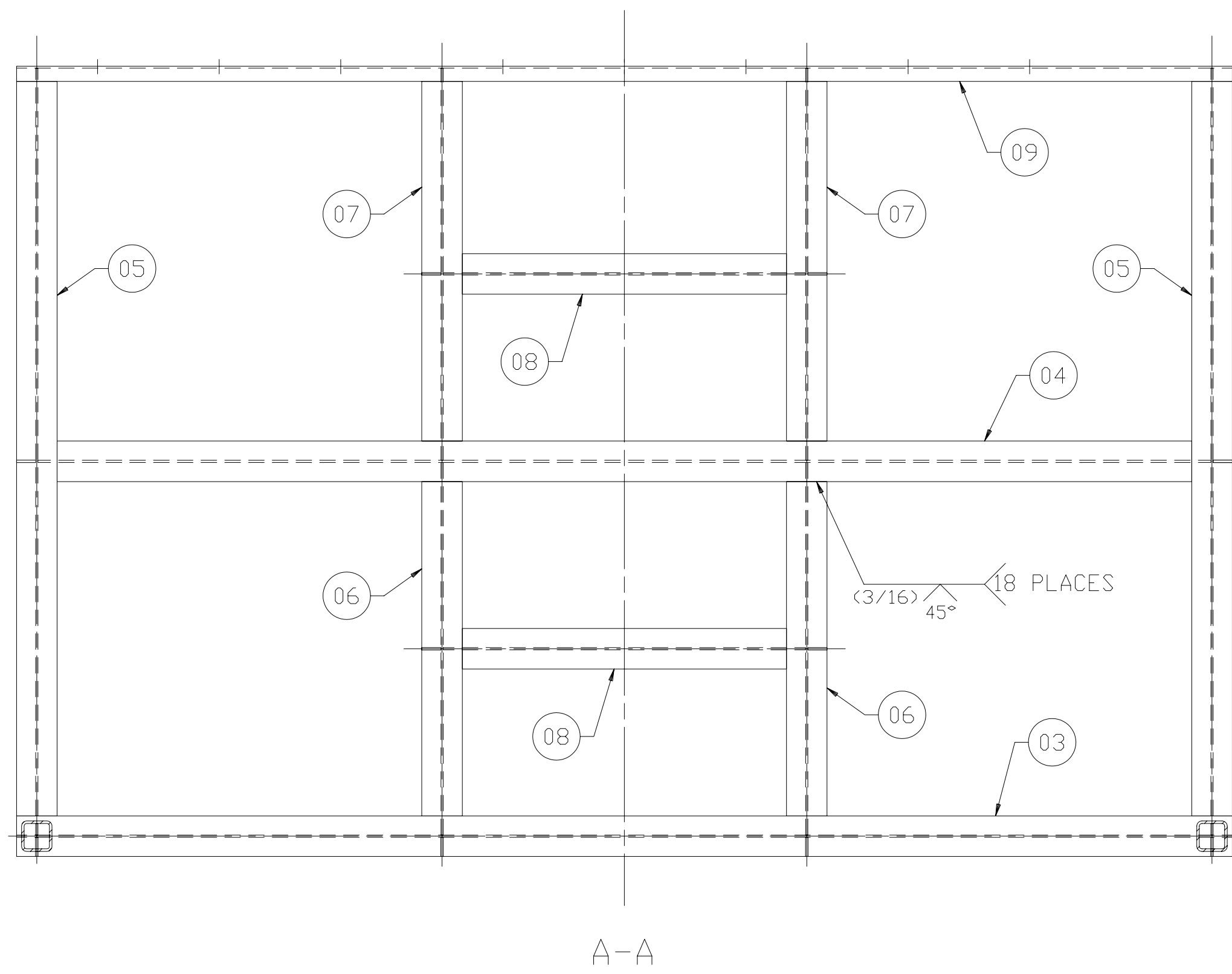
DRAWN: RAJ	3/06	PLATFORM, METAL TREATMENT	
CHECKED:		SHAW ENVIRONMENTAL, INC., CONCORD, CA	
APPROVED:		DRAWING NUMBER	SHEET
DISK NO:		SED1017	1 OF 8
SCALE: .08		REV	N/C

TOLERANCES: (UNLESS NOTED OTHERWISE)
 FRACTIONAL ± 1/16
 .XX ± .06
 .XXX ± .030
 ANGULAR ± 5°

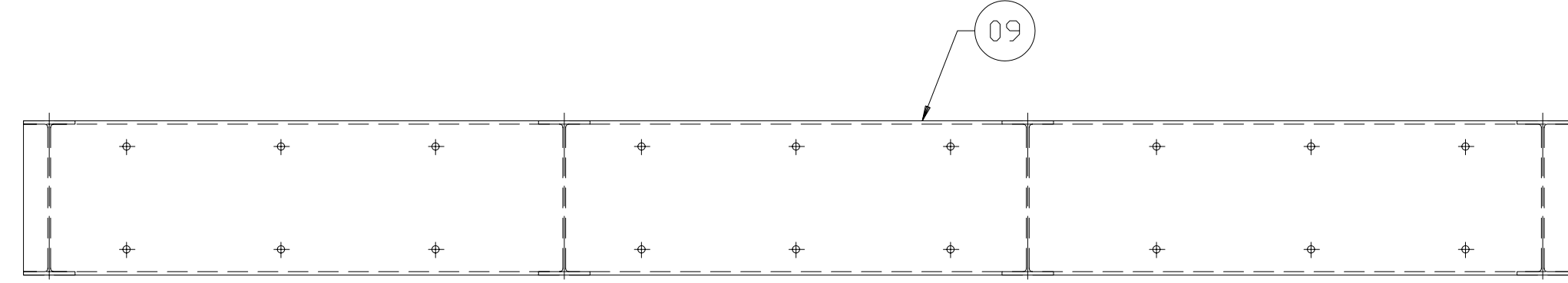
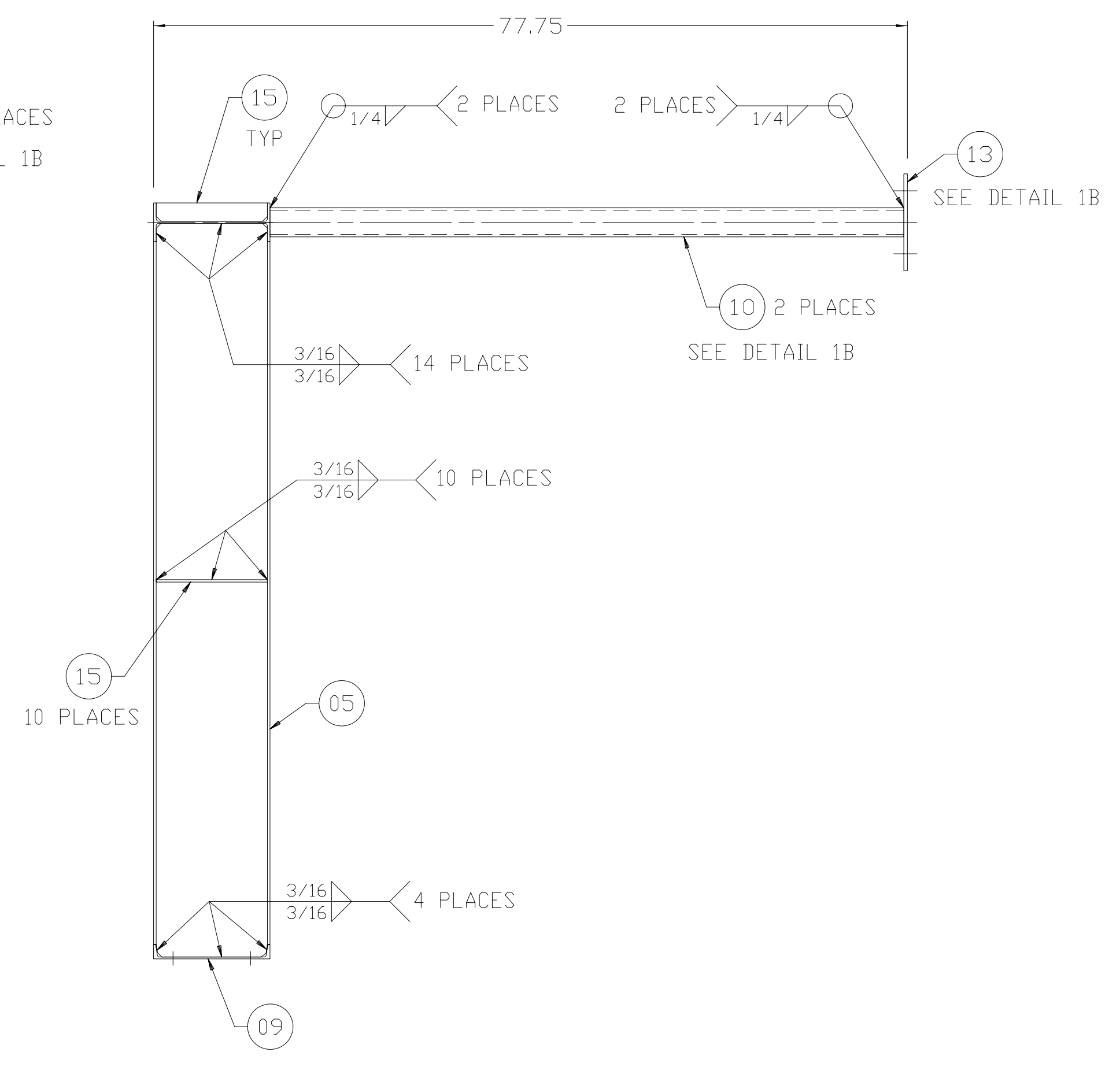
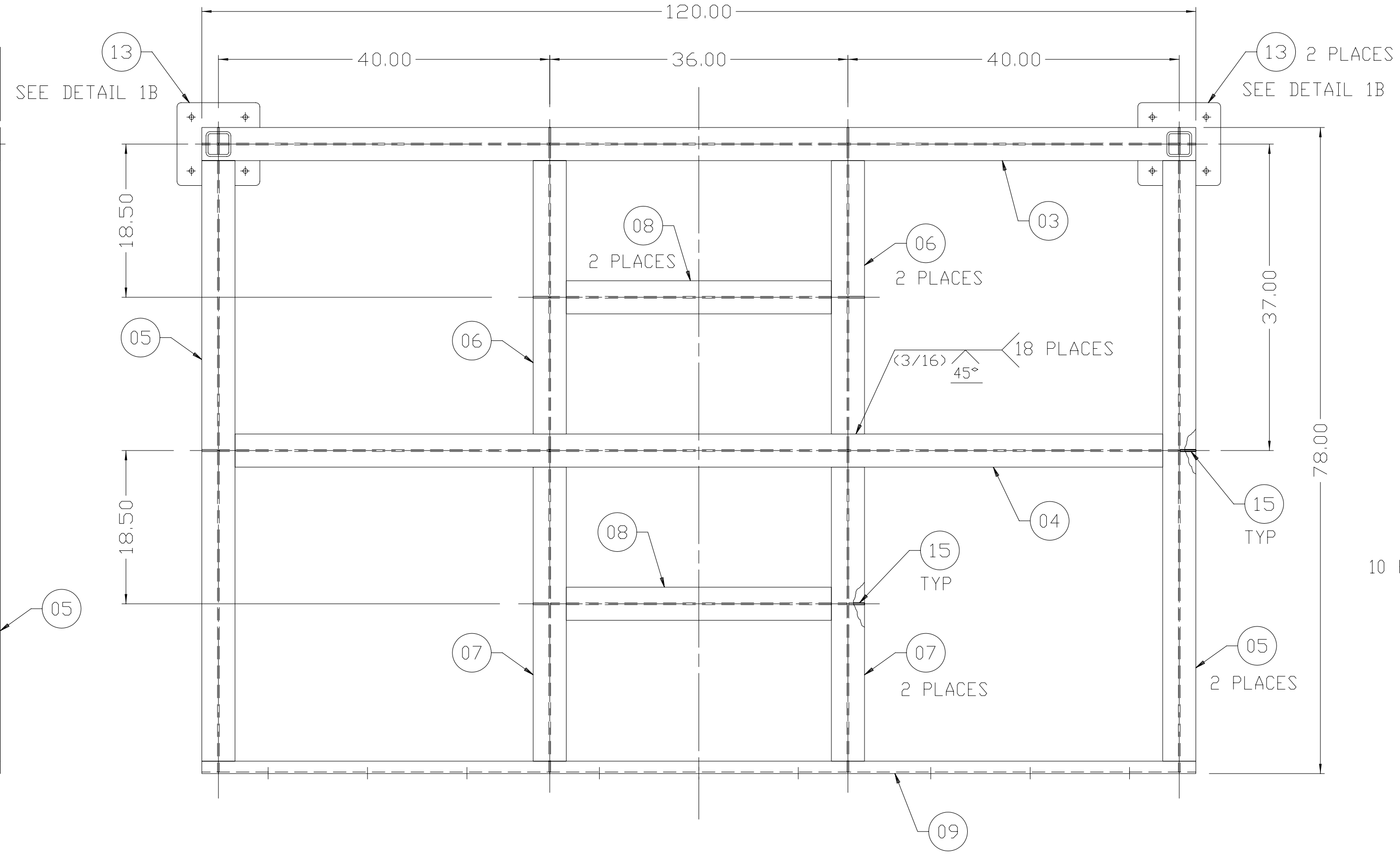
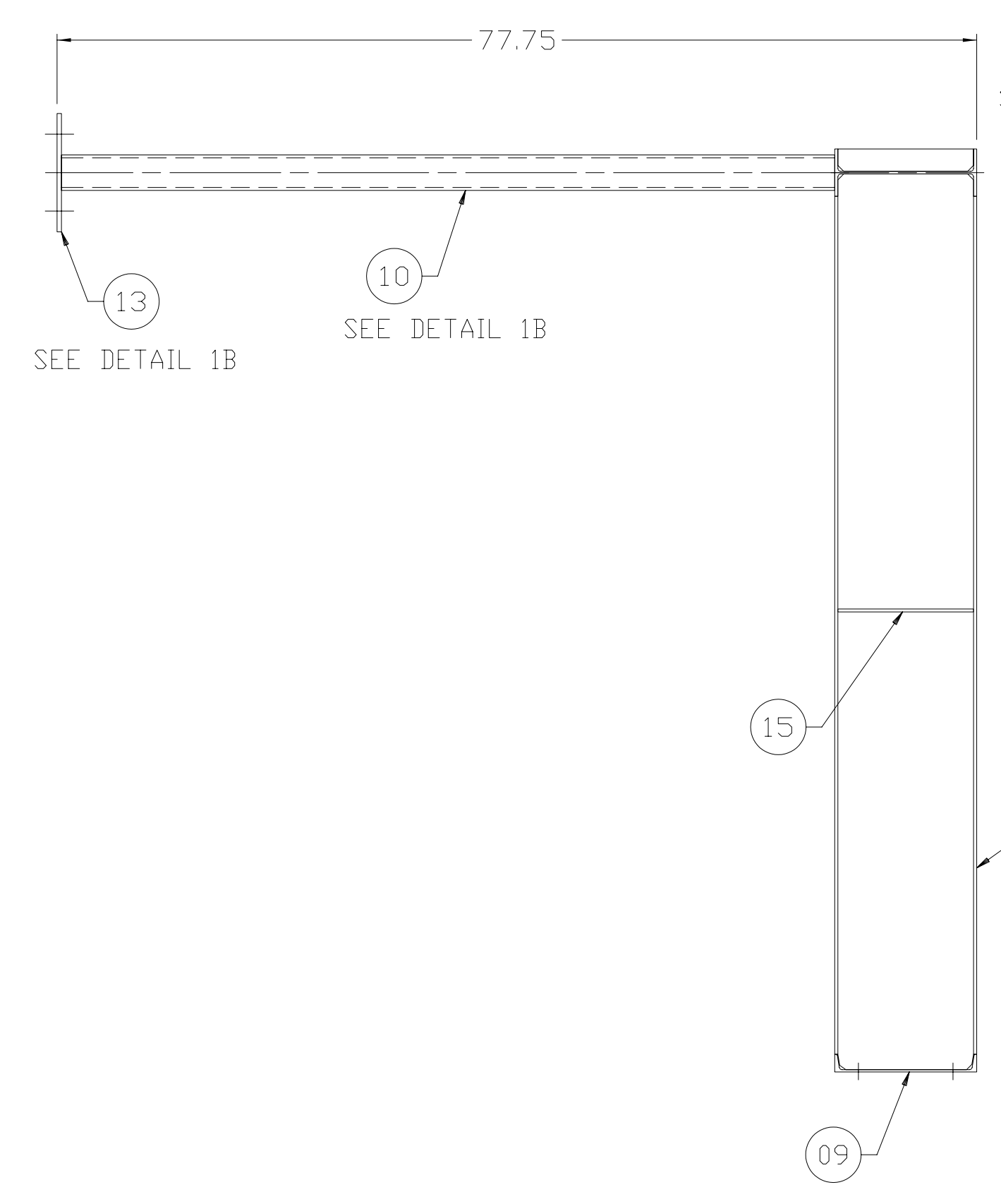
THIS DRAWING, AND THE INFORMATION CONTAINED HEREIN, IS THE PROPERTY OF VERSACO MANUFACTURING, INC. AND SHALL NOT BE REPRODUCED, COPIED OR OTHERWISE DISPOSED OF WITHOUT PRIOR APPROVAL. IT MAY NOT BE USED IN WHOLE OR IN PART TO ASSIST IN THE MANUFACTURING OF DRAWINGS, PRINTS, PARTS, OR EQUIPMENT WITHOUT THE FULL KNOWLEDGE AND WRITTEN CONSENT OF VERSACO MANUFACTURING, INC.

REV	DATE	DESCRIPTION OF REVISION	BY	CHK

NEXT ASS'Y: _____ JOB #: 06063



DETAIL 1B
2 PLACES



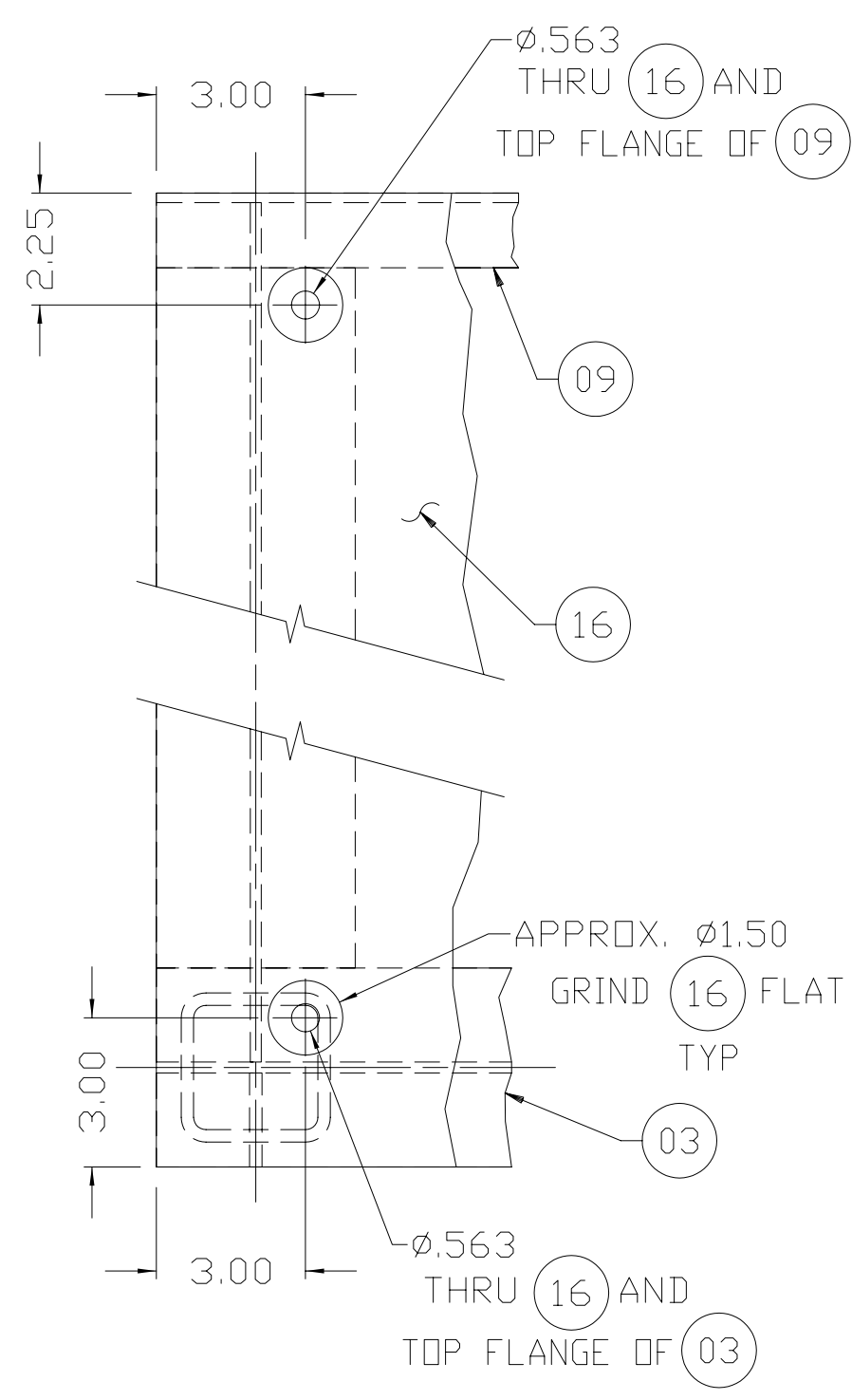
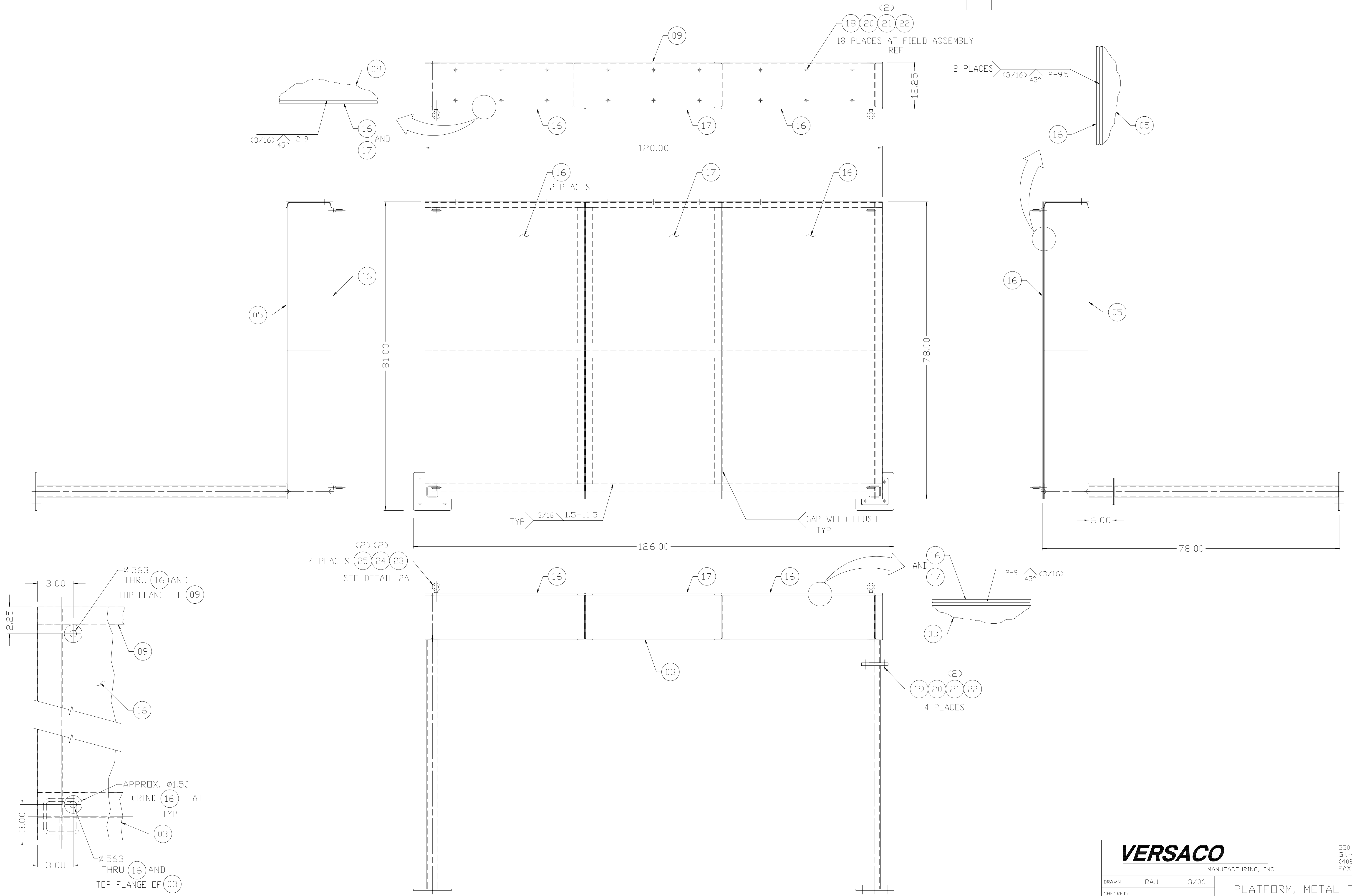
DETAIL 1
FRAME WELDMENT FOR PLATFORM 1

REV	DATE	DESCRIPTION OF REVISION	BY	CHK

NEXT ASS'Y: _____ JOB #: 06063

VERSACO MANUFACTURING, INC.		550 Luchessa Avenue Gilroy, Calif 95020 (408) 848-2880 FAX 848-5201	
		PLATFORM, METAL TREATMENT SHAW ENVIRONMENTAL, INC., CONCORD, CA	
DRAWN: RAJ	3/06	DRAWING NUMBER	REV
CHECKED:		SED1017	2 OF 8
APPROVED:			N/C
DISK NO:			
SCALE: .08			
TOLERANCES: (UNLESS NOTED OTHERWISE) FRACTIONAL ± 1/16 .XX ± .06 .XXX ± .030 ANGULAR ± 5°		THIS DRAWING, AND THE INFORMATION CONTAINED HEREIN, IS THE PROPERTY OF VERSACO MANUFACTURING, INC. AND SHALL NOT BE REPRODUCED, COPIED OR OTHERWISE DISPOSED OF WITHOUT PRIOR APPROVAL. IT MAY NOT BE USED IN WHOLE OR IN PART TO ASSIST IN THE MANUFACTURING OF DRAWINGS, PRINTS, PARTS, OR EQUIPMENT WITHOUT THE FULL KNOWLEDGE AND WRITTEN CONSENT OF VERSACO MANUFACTURING, INC.	

ITEM	QTY	DWG / PART NO.	DESCRIPTION
------	-----	----------------	-------------



DETAIL 2A
2 PLACES

-02
PLATFORM 2
SEE DETAIL 2, SHEET 4 FOR FRAME WELDMENT

REV	DATE	DESCRIPTION OF REVISION	BY	CHK

NEXT ASS'Y: _____ JOB #: 06063

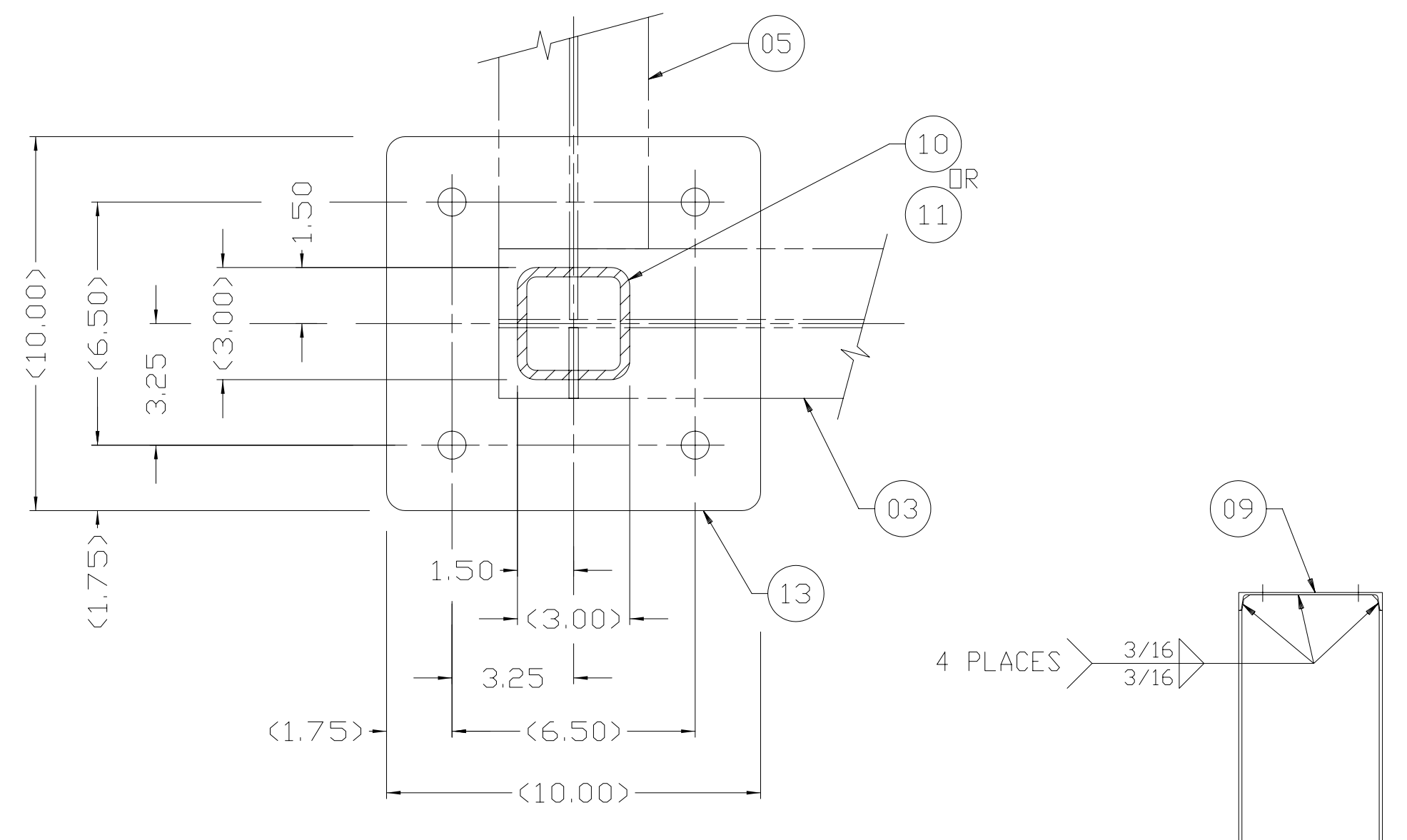
VERSACO MANUFACTURING, INC.

550 Luchessa Avenue
Gilroy, Calif 95020
(408) 848-2880
FAX 848-5201

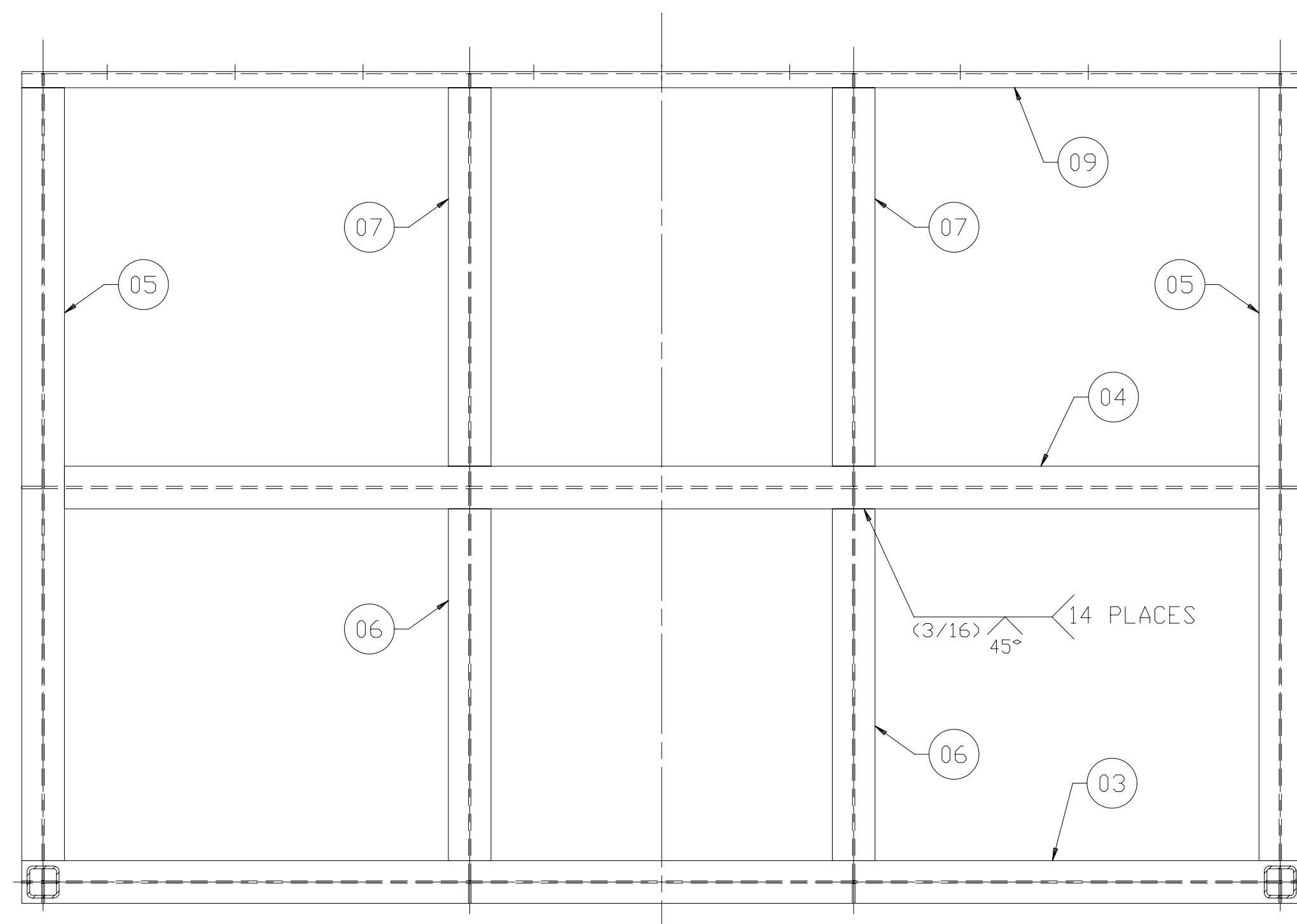
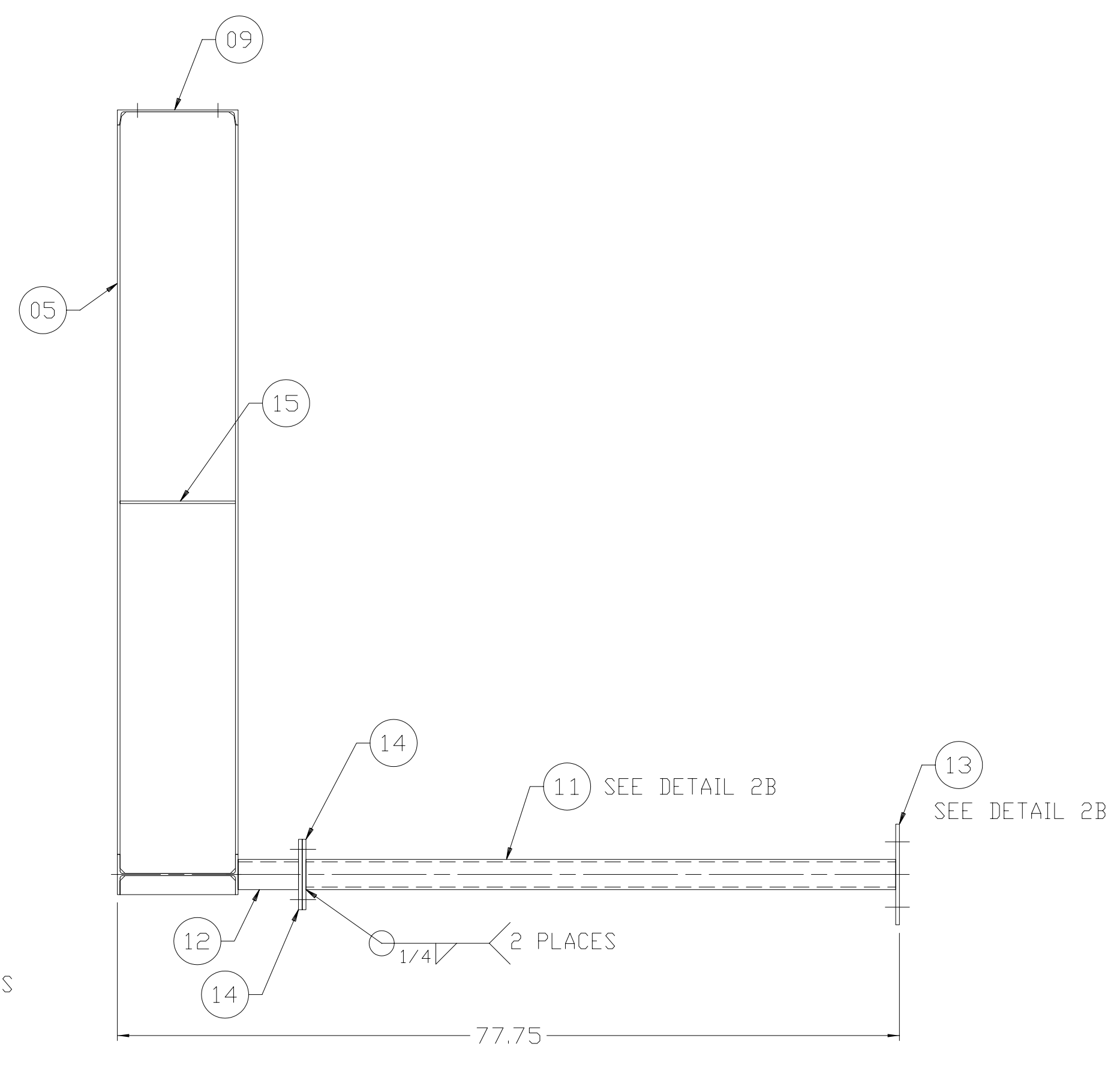
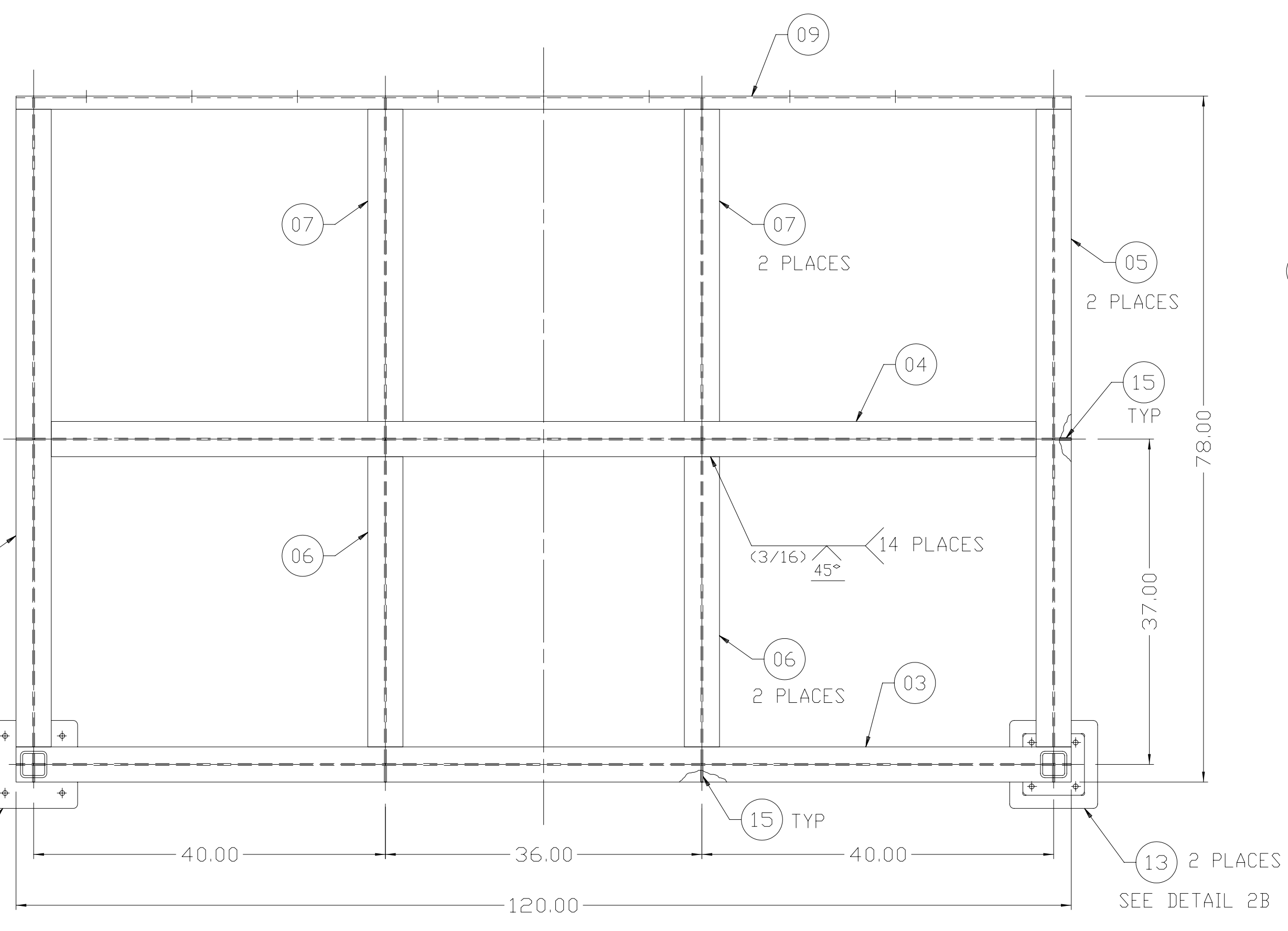
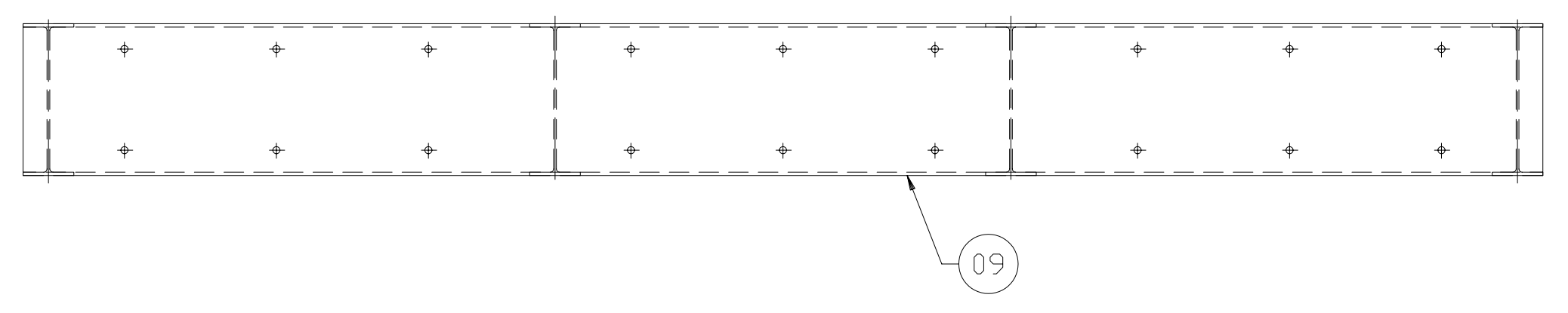
DRAWN: RAJ	3/06	PLATFORM, METAL TREATMENT SHAW ENVIRONMENTAL, INC., CONCORD, CA
CHECKED:		
APPROVED:		
DISK NO:		
SCALE: .08	DRAWING NUMBER SED1017	SHEET 3 OF 8
TOLERANCES: (UNLESS NOTED OTHERWISE)	FRACTIONAL ± 1/16 XXX ± .06 ANGULAR ± 5°	REV N/C

THIS DRAWING, AND THE INFORMATION CONTAINED HEREIN, IS THE PROPERTY OF VERSACO MANUFACTURING, INC. AND SHALL NOT BE REPRODUCED, COPIED OR OTHERWISE DISPOSED OF WITHOUT PRIOR APPROVAL. IT MAY NOT BE USED IN WHOLE OR IN PART TO ASSIST IN THE MANUFACTURING OF DRAWINGS, PRINTS, PARTS, OR EQUIPMENT WITHOUT THE FULL KNOWLEDGE AND WRITTEN CONSENT OF VERSACO MANUFACTURING, INC.

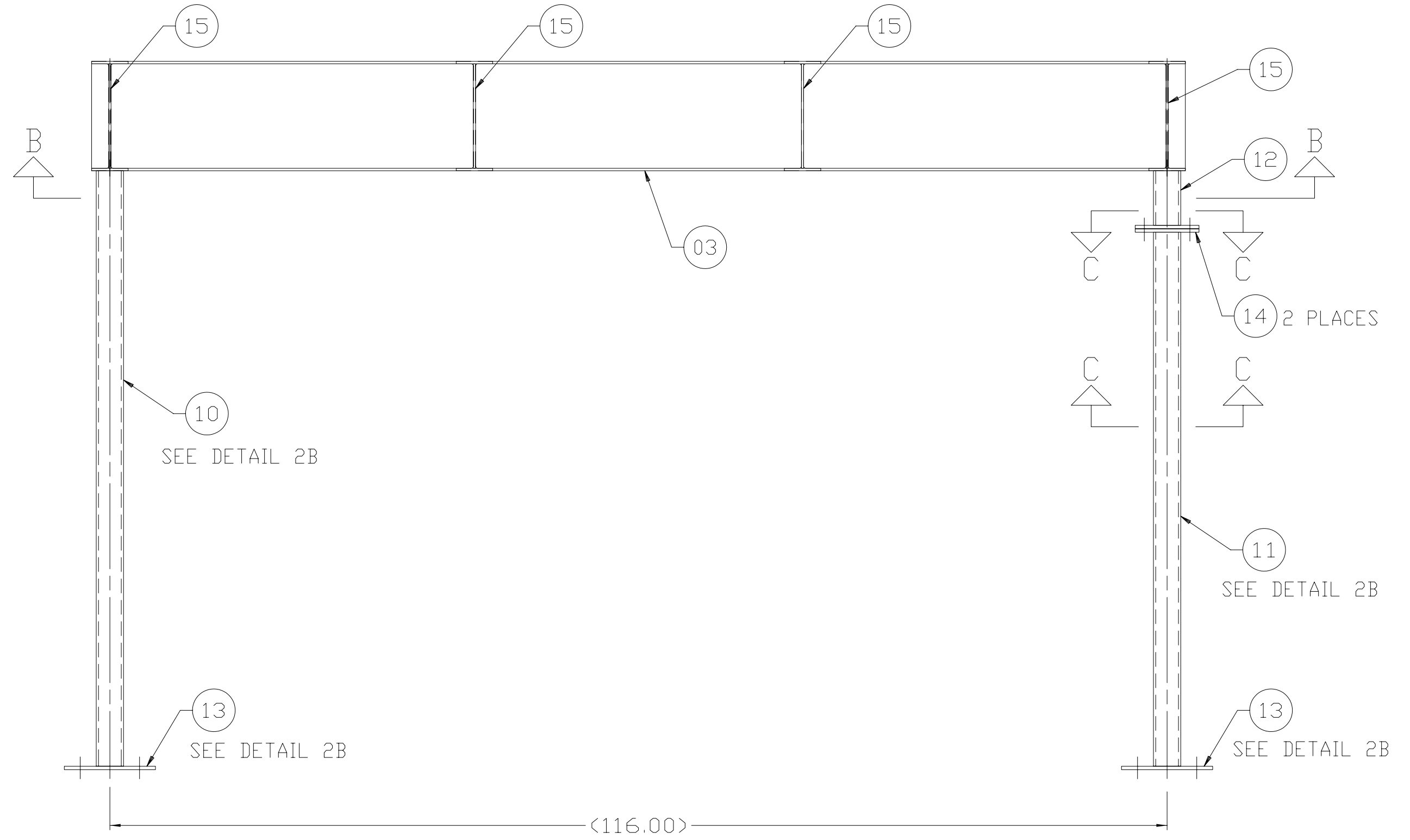
ITEM	-01	-02	DWG / PART NO.	DESCRIPTION
------	-----	-----	----------------	-------------



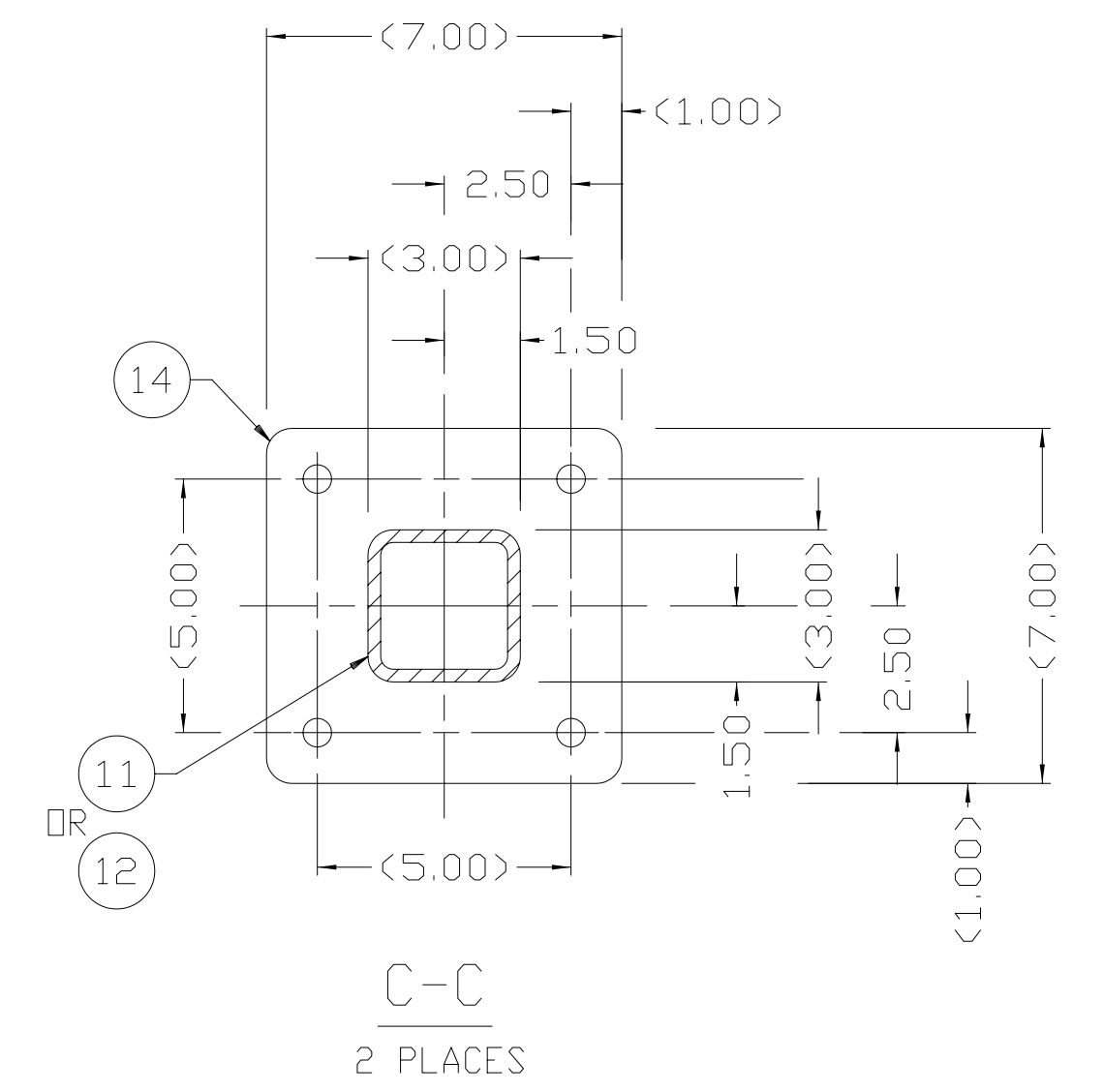
DETAIL 2B
2 PLACES



B-B



DETAIL 2
FRAME WELDMENT FOR PLATFORM 2



VERSACO
MANUFACTURING, INC.

550 Luchessa Avenue
Gilroy, Calif 95020
(408) 848-2880
FAX 848-5201

DRAWN: RAJ	3/06	PLATFORM, METAL TREATMENT	
CHECKED:		SHAW ENVIRONMENTAL, INC., CONCORD, CA	
APPROVED:		DRAWING NUMBER	SHEET
DISK NO:		SED1017	4 OF 8
SCALE: .08		REV	N/C

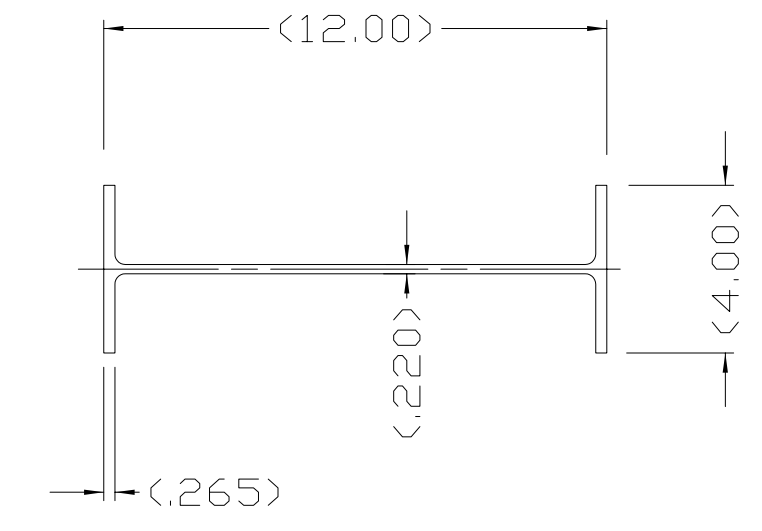
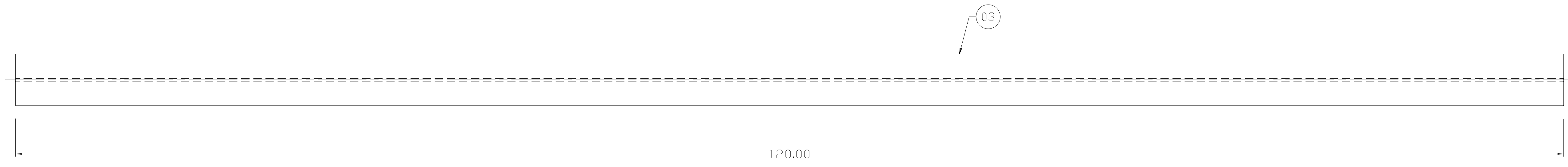
REV	DATE	DESCRIPTION OF REVISION	BY	CHK

NEXT ASS'Y: _____ JOB #: 06063

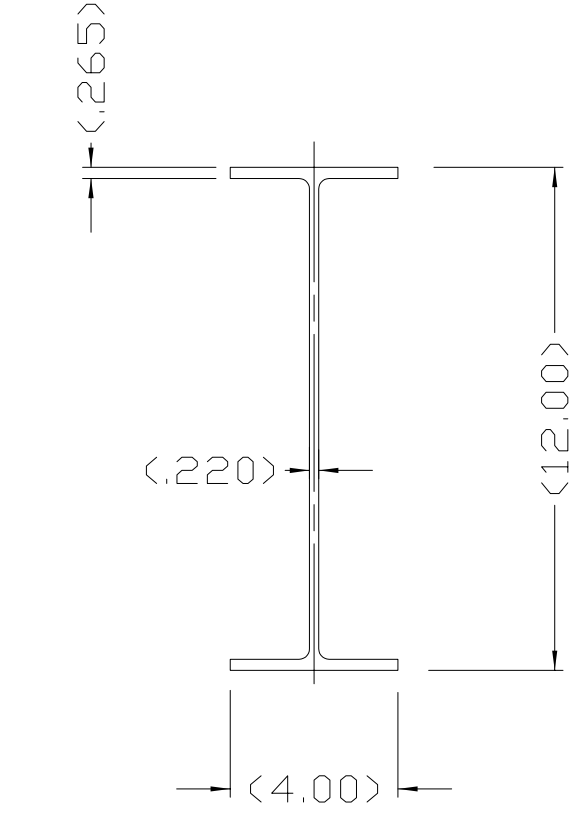
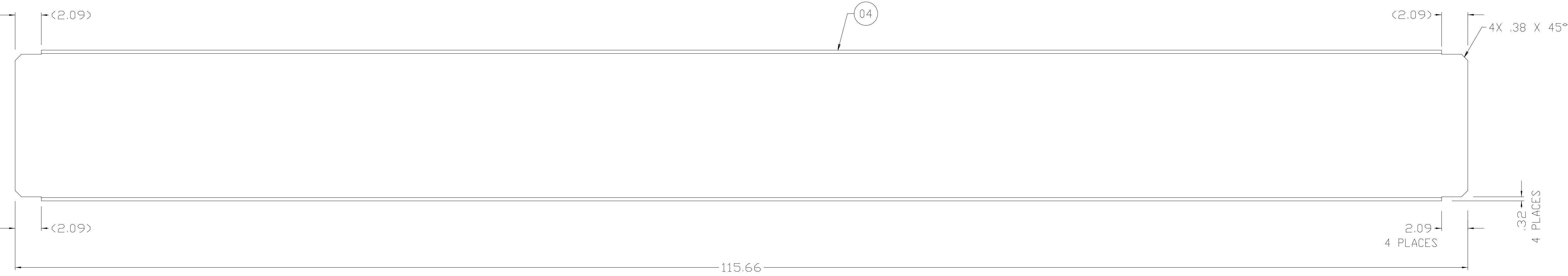
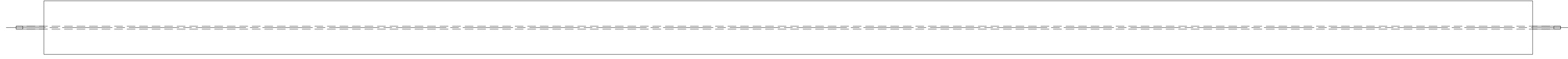
TOLERANCES: (UNLESS NOTED OTHERWISE)
 FRACTIONAL ± 1/16
 .XX ± .06
 .XXX ± .030
 ANGULAR ± 5°

THIS DRAWING, AND THE INFORMATION CONTAINED HEREIN, IS THE PROPERTY OF VERSACO MANUFACTURING, INC. AND SHALL NOT BE REPRODUCED, COPIED OR OTHERWISE DISPOSED OF WITHOUT PRIOR APPROVAL. IT MAY NOT BE USED IN WHOLE OR IN PART TO ASSIST IN THE MANUFACTURING OF DRAWINGS, PRINTS, PARTS, OR EQUIPMENT WITHOUT THE FULL KNOWLEDGE AND WRITTEN CONSENT OF VERSACO MANUFACTURING, INC.

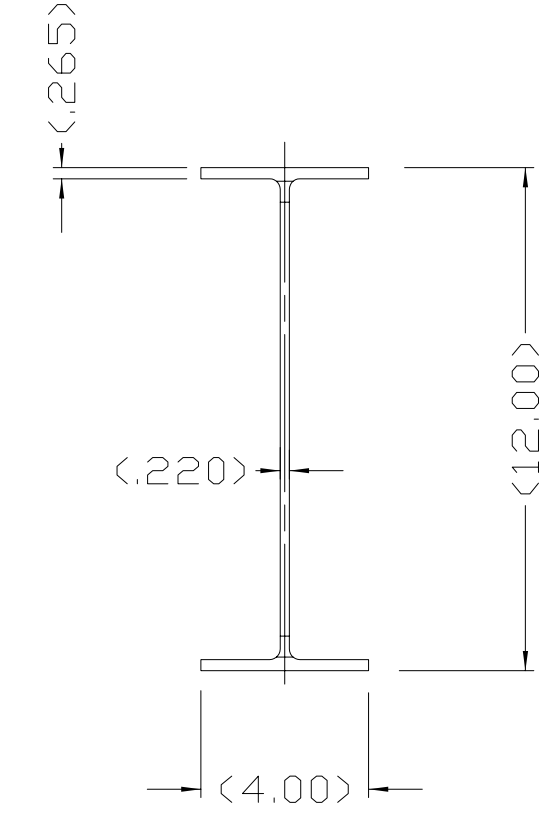
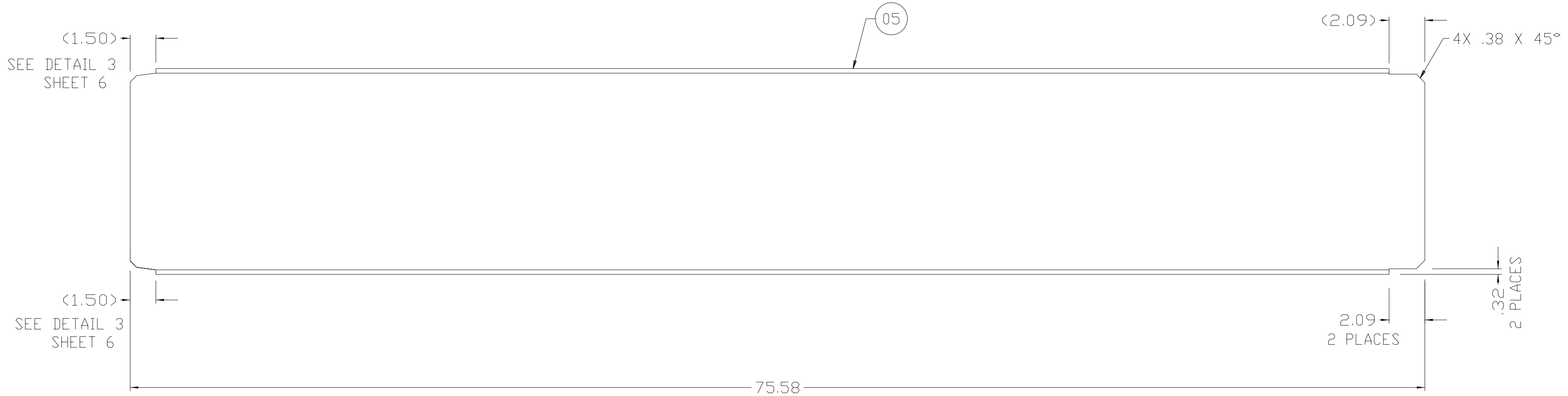
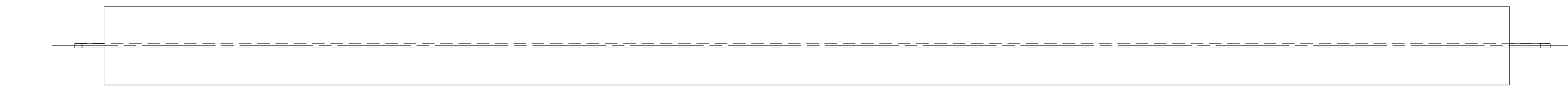
ITEM	QTY	DWG / PART NO.	DESCRIPTION
------	-----	----------------	-------------



-03
MATERIAL: ASTM A36/50 W12 X 16
1 PLACE -01
1 PLACE -02



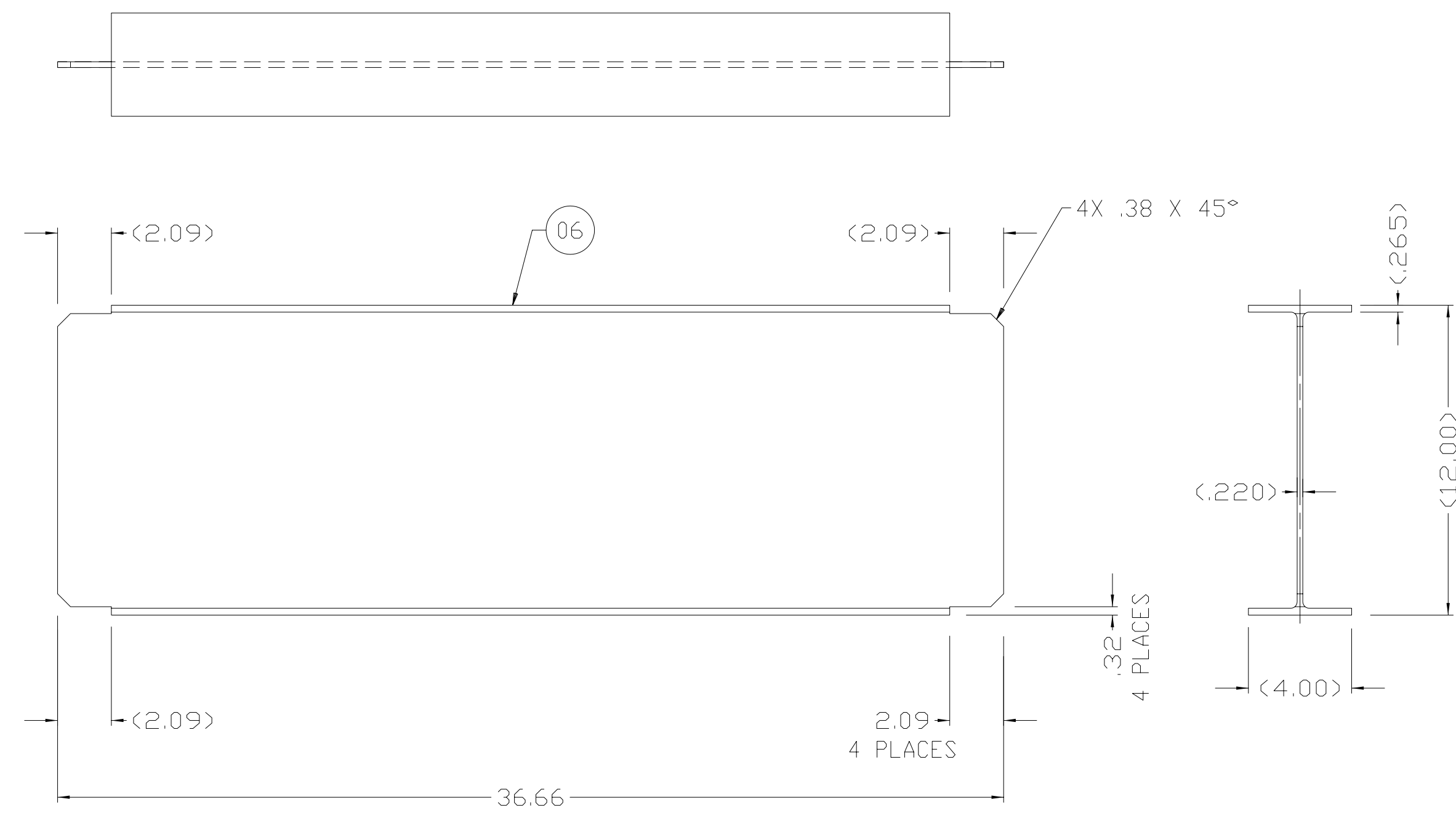
-04
MATERIAL: ASTM A36/50 W12 X 16
1 PLACE -01
1 PLACE -02



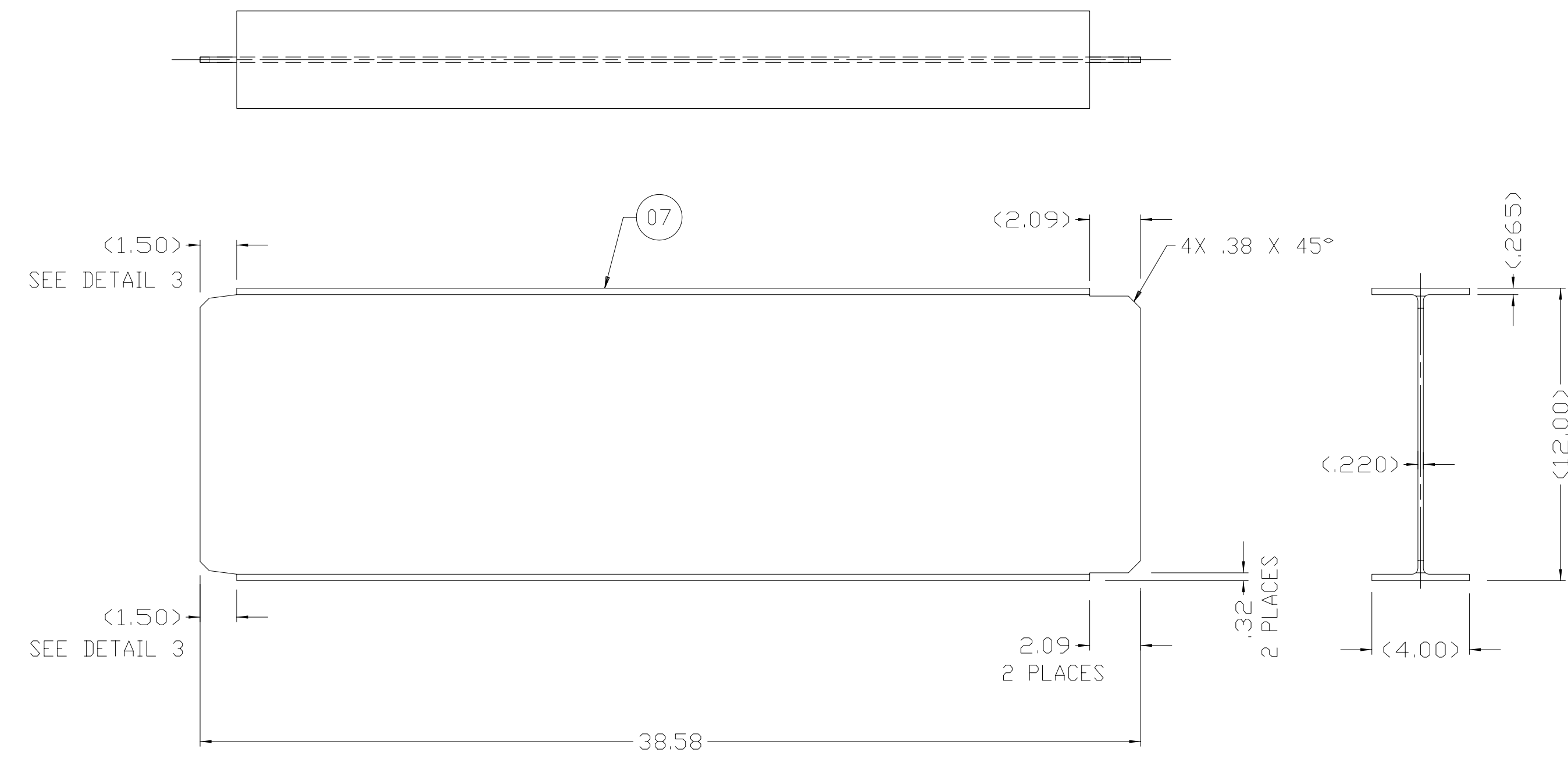
-05
MATERIAL: ASTM A36/50 W12 X 16
2 PLACES -01
2 PLACES -02

VERSACO		550 Luchessa Avenue Gilroy, Calif 95020 (408) 848-2880 FAX 848-5201		
DRAWN: RAJ		3/06		
CHECKED:				
APPROVED:				
DISK NO:		DRAWING NUMBER		
SCALE: .20		SED1017		
		SHEET 5 OF 8		
		REV N/C		
TOLERANCES: (UNLESS NOTED OTHERWISE)		THIS DRAWING AND THE INFORMATION CONTAINED HEREIN IS THE PROPERTY OF VERSACO MANUFACTURING, INC. AND SHALL NOT BE REPRODUCED, COPIED OR OTHERWISE DISPOSED OF WITHOUT PRIOR APPROVAL. IT MAY NOT BE USED IN WHOLE OR IN PART TO ASSIST IN THE MANUFACTURING OF DRAWINGS, PRINTS, PARTS, OR EQUIPMENT WITHOUT THE FULL KNOWLEDGE AND WRITTEN CONSENT OF VERSACO MANUFACTURING, INC.		
REV	DATE	DESCRIPTION OF REVISION	BY	CHK
NEXT ASS'Y:		JOB #: 06063		

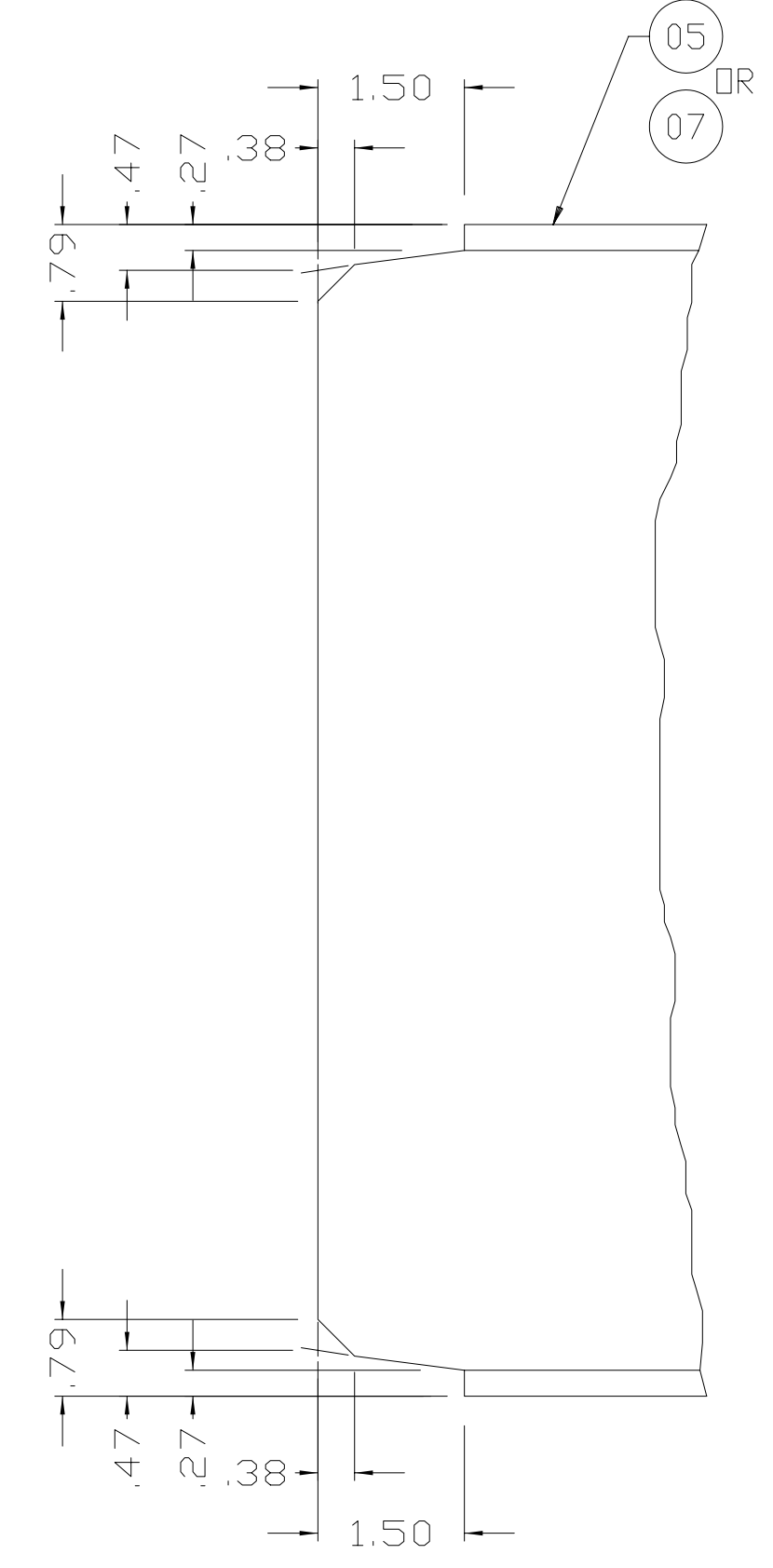
ITEM	QTY	DWG / PART NO.	DESCRIPTION
------	-----	----------------	-------------



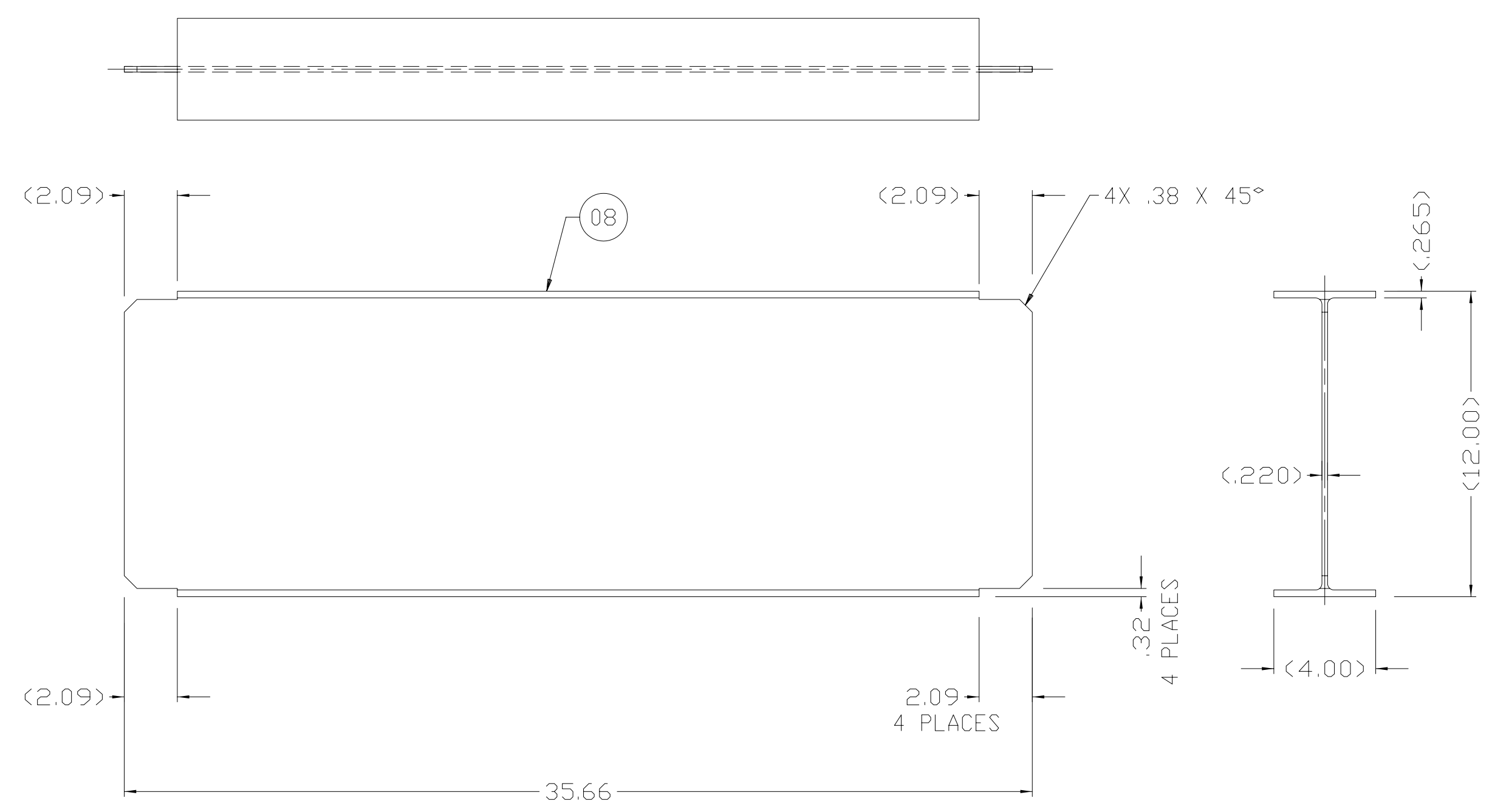
-06
MATERIAL: ASTM A36/50 W12 X 16
2 PLACES -01
2 PLACES -02



-07
MATERIAL: ASTM A36/50 W12 X 16
2 PLACES -01
2 PLACES -02



DETAIL 3
1 PLACE -05
1 PLACE -07

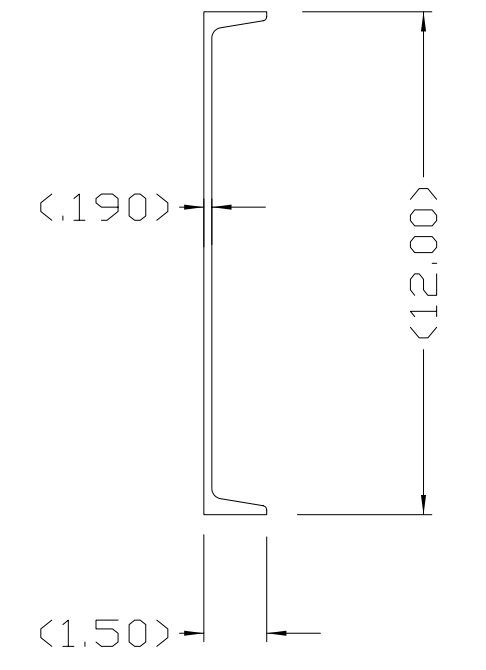
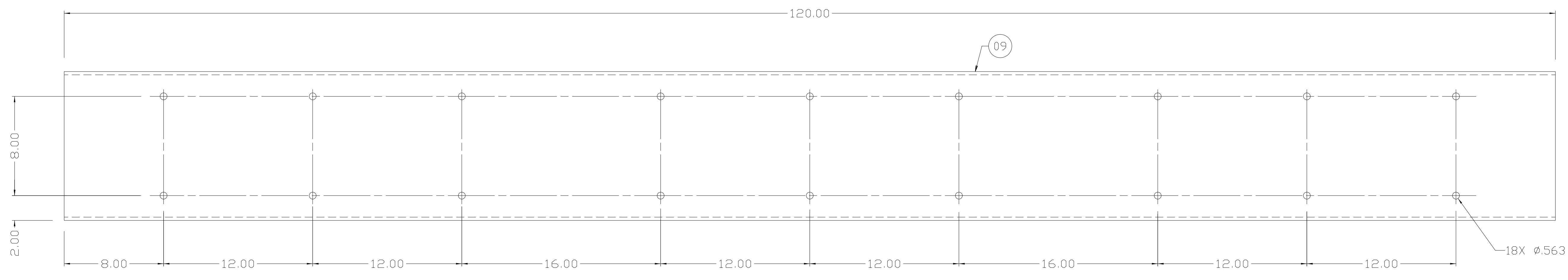


-08
MATERIAL: ASTM A36/50 W12 X 16
2 PLACES -01 ONLY

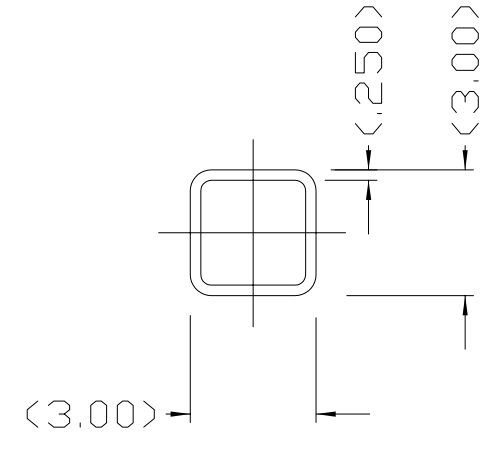
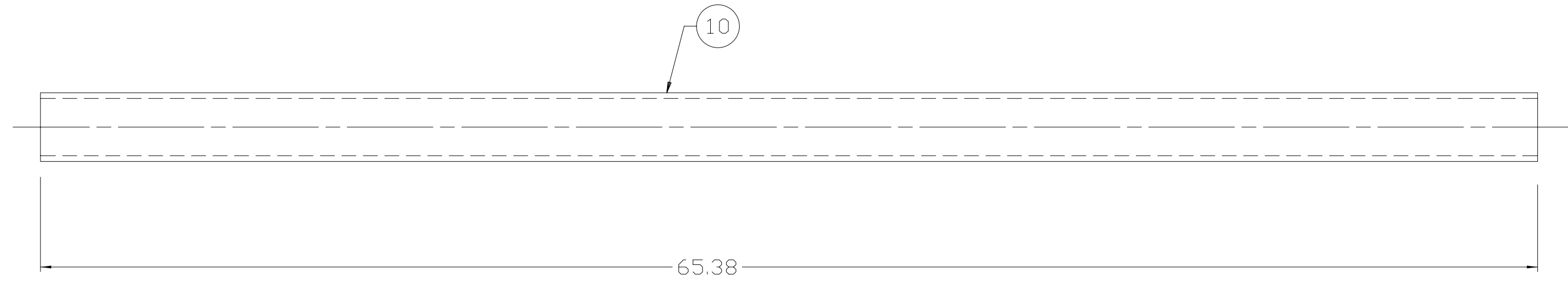
REV	DATE	DESCRIPTION OF REVISION	BY	CHK
NEXT ASS'Y:		JOB #: 06063		

VERSACO MANUFACTURING, INC.		550 Luchessa Avenue Gilroy, Calif 95020 (408) 848-2880 FAX 848-5201	
		PLATFORM, METAL TREATMENT SHAW ENVIRONMENTAL, INC., CONCORD, CA	
DRAWN: RAJ	3/06	DRAWING NUMBER	SHEET
CHECKED:		SED1017	6 OF 8
APPROVED:		REV	N/C
DISK NO:		SCALE: .20	
TOLERANCES: (UNLESS NOTED OTHERWISE)		THIS DRAWING AND THE INFORMATION CONTAINED HEREIN IS THE PROPERTY OF VERSACO MANUFACTURING, INC. AND SHALL NOT BE REPRODUCED, COPIED OR OTHERWISE DISPOSED OF WITHOUT PRIOR APPROVAL. IT MAY NOT BE USED IN WHOLE OR IN PART TO ASSIST IN THE MANUFACTURING OF DRAWINGS, PRINTS, PARTS, OR EQUIPMENT WITHOUT THE FULL KNOWLEDGE AND WRITTEN CONSENT OF VERSACO MANUFACTURING, INC.	
FRACTIONAL	± 1/16		
XXX	± .06		
XXX	± .030		
ANGULAR	± 5°		

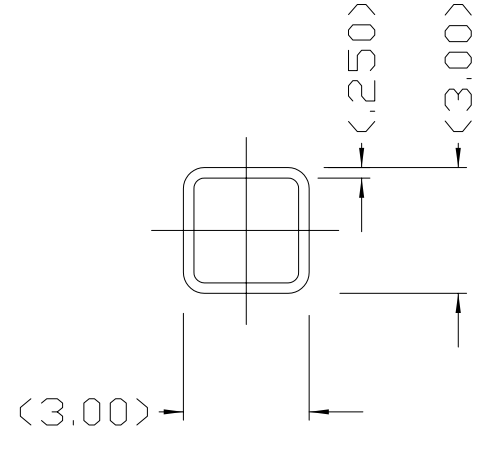
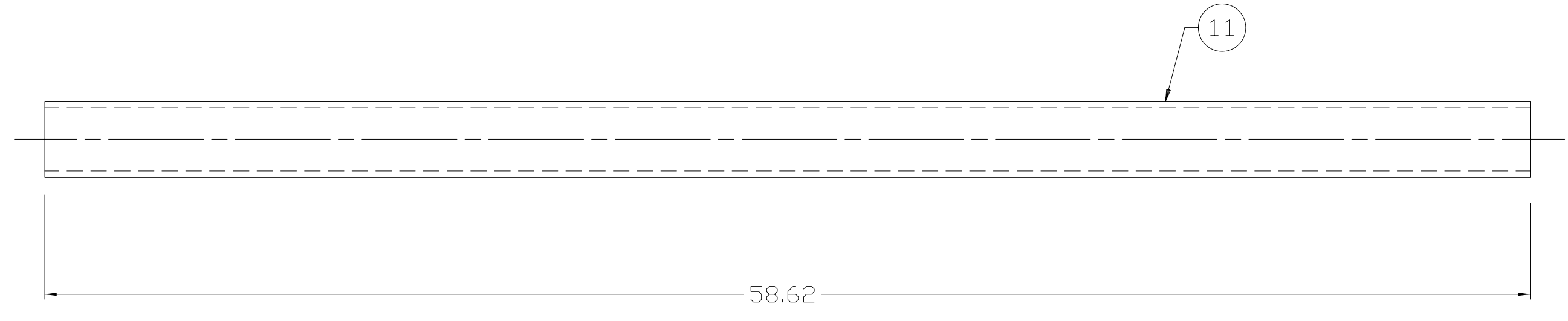
ITEM	QTY	DWG / PART NO.	DESCRIPTION
------	-----	----------------	-------------



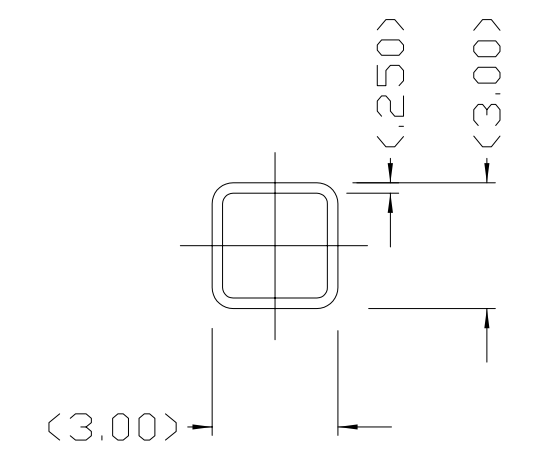
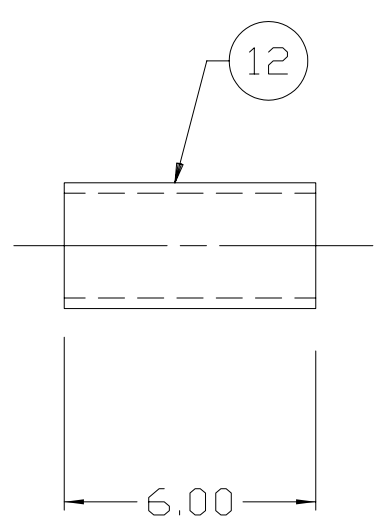
-09
MATERIAL: ASTM A36 MC12 X 10.6
1 PLACE -01
1 PLACE -02



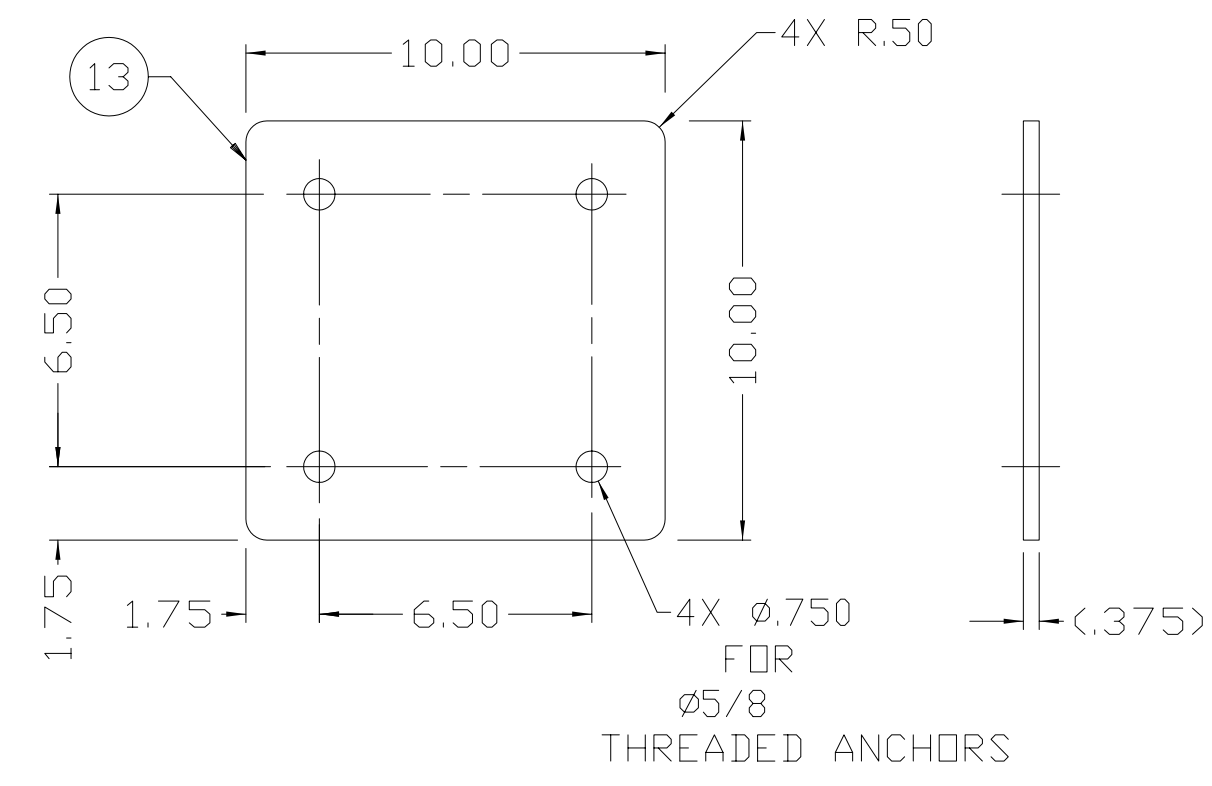
-10
MATERIAL: ASTM A500 GR. B SQ. TUBE 3.00 X 3.00 X .250W
2 PLACES -01
1 PLACE -02



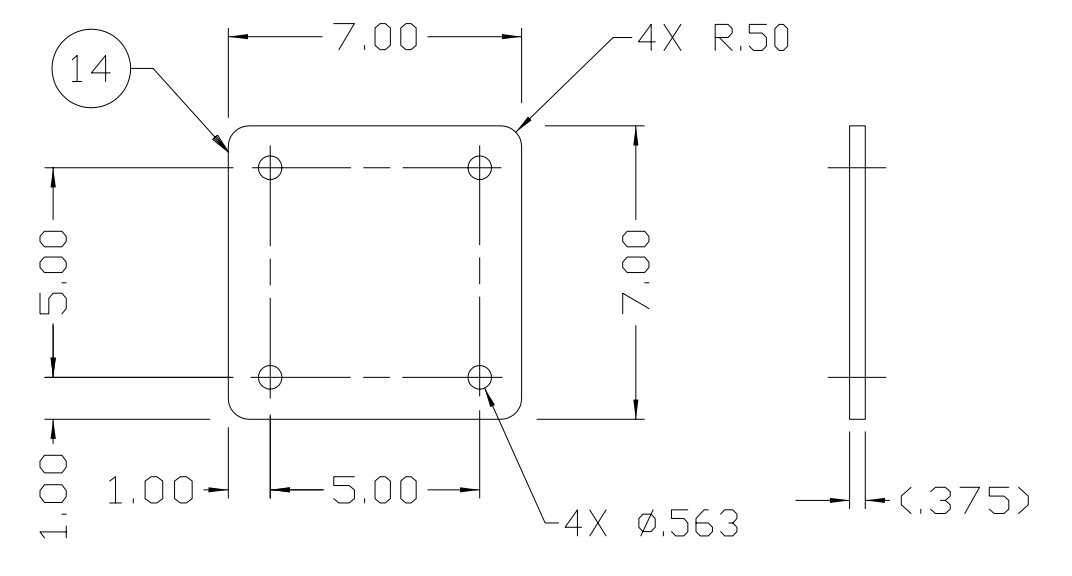
-11
MATERIAL: ASTM A500 GR. B SQ. TUBE 3.00 X 3.00 X .250W
1 PLACE -02 ONLY



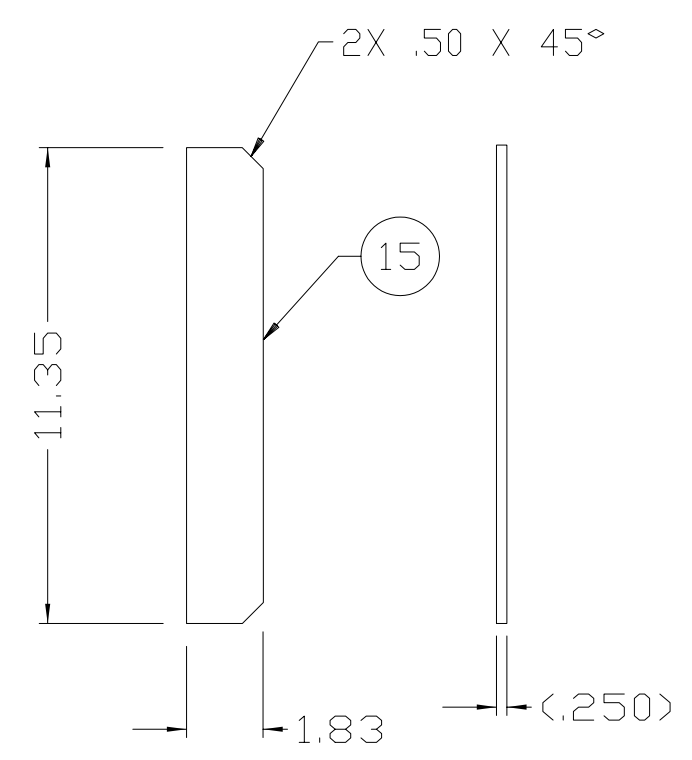
-12
MATERIAL: ASTM A500 GR. B SQ. TUBE 3.00 X 3.00 X .250W
1 PLACE -02 ONLY



-13
MATERIAL: ASTM A36 PL .375
2 PLACES -01
2 PLACES -02



-14
MATERIAL: ASTM A36 PL .375
2 PLACES -02 ONLY



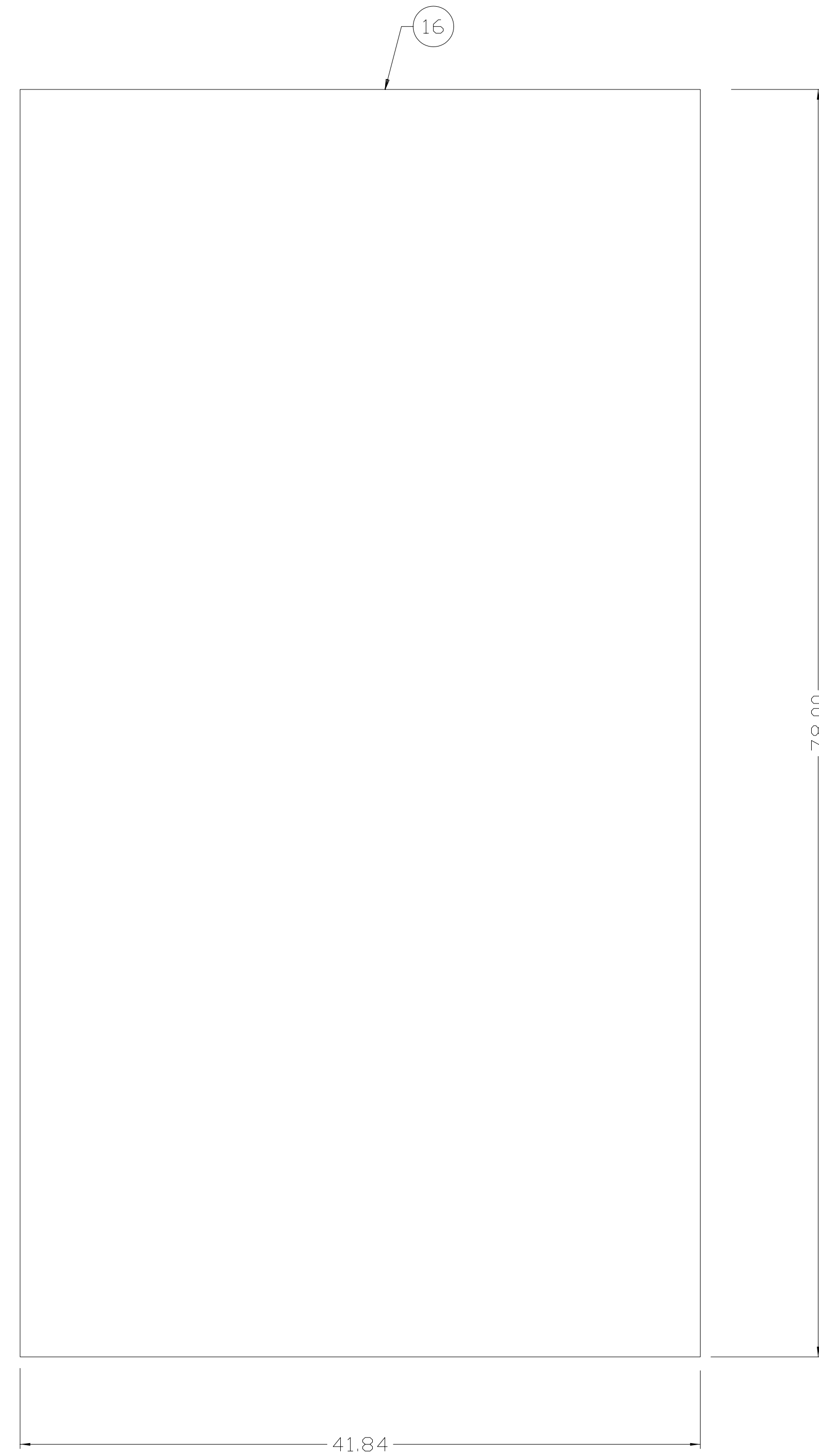
-15
MATERIAL: ASTM A36 PL .250
10 PLACES -01
6 PLACES -02

REV	DATE	DESCRIPTION OF REVISION	BY	CHK

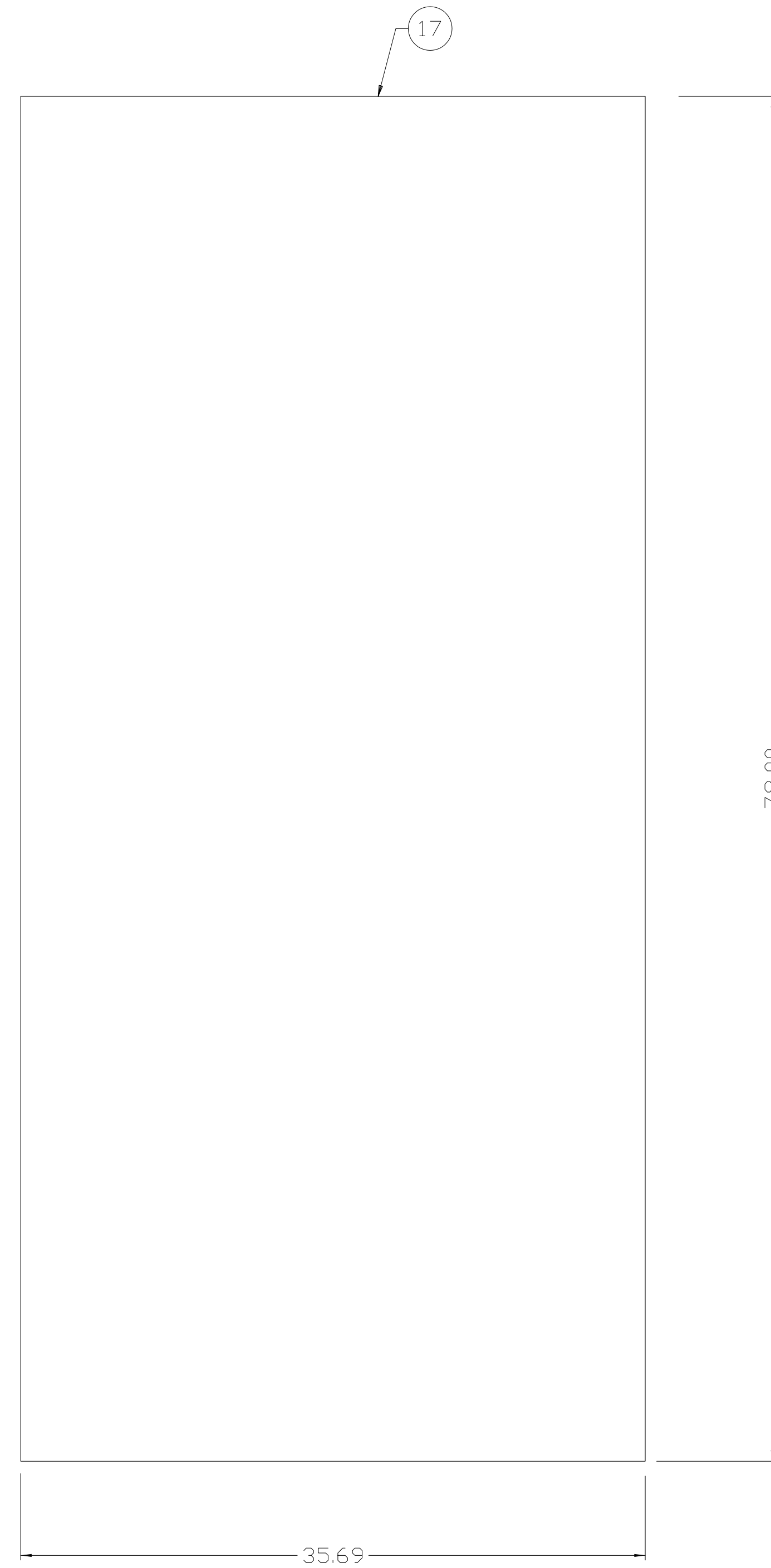
NEXT ASS'Y: _____ JOB #: 06063

VERSACO MANUFACTURING, INC.		550 Luchessa Avenue Gilroy, Calif 95020 (408) 848-2880 FAX 848-5201	
		DRAWN: RAJ 3/06 CHECKED: _____ APPROVED: _____ DISK NO: _____ SCALE: .20	
PLATFORM, METAL TREATMENT SHAW ENVIRONMENTAL, INC., CONCORD, CA		DRAWING NUMBER SED1017	SHEET 7 OF 8
TOLERANCES: (UNLESS NOTED OTHERWISE) FRACTIONAL ± 1/16 . XX ± .06 . XXX ± .030 ANGULAR ± 5°		THIS DRAWING, AND THE INFORMATION CONTAINED HEREIN, IS THE PROPERTY OF VERSACO MANUFACTURING, INC. AND SHALL NOT BE REPRODUCED, COPIED OR OTHERWISE DISPOSED OF WITHOUT PRIOR APPROVAL. IT MAY NOT BE USED IN WHOLE OR IN PART TO ASSIST IN THE MANUFACTURING OF DRAWINGS, PRINTS, PARTS, OR EQUIPMENT WITHOUT THE FULL KNOWLEDGE AND WRITTEN CONSENT OF VERSACO MANUFACTURING, INC.	

ITEM	QTY	DWG / PART NO.	DESCRIPTION
------	-----	----------------	-------------



-16
MATERIAL: ASTM A786 FLOOR PL .250
2 PLACES -01
2 PLACES -02



-17
MATERIAL: ASTM A786 FLOOR PL .250
1 PLACE -01
1 PLACE -02

REV	DATE	DESCRIPTION OF REVISION	BY	CHK
NEXT ASS'Y:		JOB #: 06063		

VERSACO MANUFACTURING, INC.		550 Luchessa Avenue Gilroy, Calif 95020 (408) 848-2880 FAX 848-5201	
		PLATFORM, METAL TREATMENT SHAW ENVIRONMENTAL, INC., CONCORD, CA	
DRAWN: RAJ	3/06	DRAWING NUMBER	SHEET
CHECKED:		SED1017	8 OF 8
APPROVED:			REV
DISK NO:			N/C
SCALE: .15			
TOLERANCES: (UNLESS NOTED OTHERWISE) FRACTIONAL ± 1/16 XX ± .06 XXX ± .030 ANGULAR ± .5°		THIS DRAWING AND THE INFORMATION CONTAINED HEREIN IS THE PROPERTY OF VERSACO MANUFACTURING, INC. AND SHALL NOT BE REPRODUCED, COPIED OR OTHERWISE DISPOSED OF WITHOUT PRIOR APPROVAL. IT MAY NOT BE USED IN WHOLE OR IN PART TO ASSIST IN THE MANUFACTURING OF DRAWINGS, PRINTS, PARTS, OR EQUIPMENT WITHOUT THE FULL KNOWLEDGE AND WRITTEN CONSENT OF VERSACO MANUFACTURING, INC.	

MATERIAL SAFETY DATA SHEET

N11A400
04 00

Section 1 -- PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NUMBER	N11A400	HMIS CODES	
		Health	2*
		Flammability	2
		Reactivity	0
PRODUCT NAME	SEAGUARD* 6000 EPOXY Marine Epoxy Coating (Part A), Gray		
MANUFACTURER'S NAME	THE SHERWIN-WILLIAMS COMPANY	EMERGENCY TELEPHONE NO.	(216) 566-2917
	101 Prospect Avenue N.W. Cleveland, OH 44115		
DATE OF PREPARATION	21-MAR-06	INFORMATION TELEPHONE NO.	(216) 566-2902

Section 2 -- COMPOSITION/INFORMATION ON INGREDIENTS

% by WT	CAS No.	INGREDIENT	UNITS	VAPOR PRESSURE
0.4	100-41-4	Ethylbenzene		
		ACGIH TLV	100 ppm	7.1 mm
		ACGIH TLV	125 ppm STEL	
		OSHA PEL	100 ppm	
		OSHA PEL	125 ppm STEL	
2	1330-20-7	Xylene		
		ACGIH TLV	100 ppm	5.9 mm
		ACGIH TLV	150 ppm STEL	
		OSHA PEL	100 ppm	
		OSHA PEL	150 ppm STEL	
3	64742-95-6	Light Aromatic Hydrocarbons		
		ACGIH TLV	Not Available	3.8 mm
		OSHA PEL	Not Available	
4	108-67-8	1,3,5-Trimethylbenzene		
		ACGIH TLV	25 ppm	2 mm
		OSHA PEL	25 ppm	
6	95-63-6	1,2,4-Trimethylbenzene		
		ACGIH TLV	25 ppm	2.03 mm
		OSHA PEL	25 ppm	
3	71-36-3	1-Butanol		
		ACGIH TLV	20 ppm (Skin)	5.5 mm
		OSHA PEL	50 ppm (Skin) CEILING	
22	Proprietary	Epoxy Polymer		
		ACGIH TLV	Not Available	
		OSHA PEL	Not Available	
3	Proprietary	Phenol blocked TDI Polymer		
		ACGIH TLV	Not Available	
		OSHA PEL	Not Available	
25	14807-96-6	Talc		
		ACGIH TLV	2 mg/m3 as Resp. Dust	
		OSHA PEL	2 mg/m3 as Resp. Dust	
8	12001-26-2	Mica		
		ACGIH TLV	3 mg/m3 as Resp. Dust	
		OSHA PEL	3 mg/m3 as Resp. Dust	

Continued on page 2

12	13463-67-7	Titanium Dioxide			
		ACGIH TLV	10	mg/m3	as Dust
		OSHA PEL	10	mg/m3	Total Dust
		OSHA PEL	5	mg/m3	Respirable Fraction

Section 3 -- HAZARDS IDENTIFICATION

ROUTES OF EXPOSURE

INHALATION of vapor or spray mist.

EYE or SKIN contact with the product, vapor or spray mist.

EFFECTS OF OVEREXPOSURE

EYES: Irritation.

SKIN: Prolonged or repeated exposure may cause irritation.

INHALATION: Irritation of the upper respiratory system.

May cause nervous system depression. Extreme overexposure may result in unconsciousness and possibly death.

SIGNS AND SYMPTOMS OF OVEREXPOSURE

Headache, dizziness, nausea, and loss of coordination are indications of excessive exposure to vapors or spray mists.

Redness and itching or burning sensation may indicate eye or excessive skin exposure.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

May cause allergic skin reaction in susceptible persons or skin sensitization.

CANCER INFORMATION

For complete discussion of toxicology data refer to Section 11.

Section 4 -- FIRST AID MEASURES

EYES: Flush eyes with large amounts of water for 15 minutes.
Get medical attention.

SKIN: Wash affected area thoroughly with soap and water.
If irritation persists or occurs later, get medical attention.

Remove contaminated clothing and launder before re-use.

INHALATION: If affected, remove from exposure. Restore breathing.
Keep warm and quiet.

INGESTION: Do not induce vomiting.
Get medical attention immediately.

Section 5 -- FIRE FIGHTING MEASURES

FLASH POINT	LEL	UEL
108 F PMCC	0.7	11.2

FLAMMABILITY CLASSIFICATION

Combustible, Flash above 99 and below 200 F

EXTINGUISHING MEDIA

Carbon Dioxide, Dry Chemical, Foam

UNUSUAL FIRE AND EXPLOSION HAZARDS

Closed containers may explode when exposed to extreme heat.

Application to hot surfaces requires special precautions.

During emergency conditions overexposure to decomposition products may cause a health hazard. Symptoms may not be immediately apparent. Obtain medical attention.

Continued on page 3

=====

SPECIAL FIRE FIGHTING PROCEDURES
Full protective equipment including self-contained breathing apparatus should be used.

Water spray may be ineffective. If water is used, fog nozzles are preferable. Water may be used to cool closed containers to prevent pressure build-up and possible autoignition or explosion when exposed to extreme heat.

=====

Section 6 -- ACCIDENTAL RELEASE MEASURES-----
STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Remove all sources of ignition. Ventilate the area.
Remove with inert absorbent.

=====

Section 7 -- HANDLING AND STORAGE-----
STORAGE CATEGORY

DOL Storage Class II

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Contents are COMBUSTIBLE. Keep away from heat and open flame.
Consult NFPA Code. Use approved Bonding and Grounding procedures.
Keep container closed when not in use. Transfer only to approved containers with complete and appropriate labeling. Do not take internally. Keep out of the reach of children.

=====

Section 8 -- EXPOSURE CONTROLS/PERSONAL PROTECTION-----
PRECAUTIONS TO BE TAKEN IN USE

Use only with adequate ventilation.
Avoid contact with skin and eyes. Avoid breathing vapor and spray mist.
Wash hands after using.
This coating may contain materials classified as nuisance particulates (listed "as Dust" in Section 2) which may be present at hazardous levels only during sanding or abrading of the dried film. If no specific dusts are listed in Section 2, the applicable limits for nuisance dusts are ACGIH TLV 10 mg/m³ (total dust), 3 mg/m³ (respirable fraction), OSHA PEL 15 mg/m³ (total dust), 5 mg/m³ (respirable fraction).

VENTILATION

Local exhaust preferable. General exhaust acceptable if the exposure to materials in Section 2 is maintained below applicable exposure limits. Refer to OSHA Standards 1910.94, 1910.107, 1910.108.

RESPIRATORY PROTECTION

If personal exposure cannot be controlled below applicable limits by ventilation, wear a properly fitted organic vapor/particulate respirator approved by NIOSH/MSHA for protection against materials in Section 2.

When sanding or abrading the dried film, wear a dust/mist respirator approved by NIOSH/MSHA for dust which may be generated from this product, underlying paint, or the abrasive.

PROTECTIVE GLOVES

Wear gloves which are recommended by glove supplier for protection against materials in Section 2.

EYE PROTECTION

Wear safety spectacles with unperforated sideshields.

OTHER PROTECTIVE EQUIPMENT

Use of barrier cream on exposed skin is recommended.

Continued on page 4

=====

OTHER PRECAUTIONS
This product must be mixed with other components before use. Before opening the packages, READ AND FOLLOW WARNING LABELS ON ALL COMPONENTS. Intentional misuse by deliberately concentrating and inhaling the contents can be harmful or fatal.

=====

Section 9 -- PHYSICAL AND CHEMICAL PROPERTIES

PRODUCT WEIGHT	12.14 lb/gal	1454 g/l
SPECIFIC GRAVITY	1.46	
BOILING POINT	243 - 360 F	117 - 182 C
MELTING POINT	Not Available	
VOLATILE VOLUME	33 %	
EVAPORATION RATE	Slower than ether	
VAPOR DENSITY	Heavier than air	
SOLUBILITY IN WATER	N.A.	
VOLATILE ORGANIC COMPOUNDS (VOC Theoretical)		
2.40 lb/gal	288 g/l	Less Water and Federally Exempt Solvents
2.40 lb/gal	288 g/l	Emitted VOC

=====

Section 10 -- STABILITY AND REACTIVITY

STABILITY -- Stable
CONDITIONS TO AVOID

None known.

INCOMPATIBILITY

None known.

HAZARDOUS DECOMPOSITION PRODUCTS

By fire: Carbon Dioxide, Carbon Monoxide

HAZARDOUS POLYMERIZATION

Will not occur

=====

Section 11 -- TOXICOLOGICAL INFORMATION

CHRONIC HEALTH HAZARDS

Ethylbenzene is classified by IARC as possibly carcinogenic to humans (2B) based on inadequate evidence in humans and sufficient evidence in laboratory animals. Lifetime inhalation exposure of rats and mice to high ethylbenzene concentrations resulted in increases in certain types of cancer, including kidney tumors in rats and lung and liver tumors in mice. These effects were not observed in animals exposed to lower concentrations. There is no evidence that ethylbenzene causes cancer in humans.

Prolonged overexposure to solvent ingredients in Section 2 may cause adverse effects to the liver, urinary and reproductive systems.

Rats exposed to titanium dioxide dust at 250 mg./m³ developed lung cancer, however, such exposure levels are not attainable in the workplace.

Reports have associated repeated and prolonged overexposure to solvents with permanent brain and nervous system damage.

TOXICOLOGY DATA

Continued on page 5

CAS No.	Ingredient Name				
100-41-4	Ethylbenzene	LC50	RAT	4HR	Not Available
		LD50	RAT		3500 mg/kg
1330-20-7	Xylene	LC50	RAT	4HR	5000 ppm
		LD50	RAT		4300 mg/kg
64742-95-6	Light Aromatic Hydrocarbons	LC50	RAT	4HR	Not Available
		LD50	RAT		Not Available
108-67-8	1,3,5-Trimethylbenzene	LC50	RAT	4HR	Not Available
		LD50	RAT		Not Available
95-63-6	1,2,4-Trimethylbenzene	LC50	RAT	4HR	Not Available
		LD50	RAT		Not Available
71-36-3	1-Butanol	LC50	RAT	4HR	8000 ppm
		LD50	RAT		790 mg/kg
Proprietary	Epoxy Polymer	LC50	RAT	4HR	Not Available
		LD50	RAT		Not Available
Proprietary	Phenol blocked TDI Polymer	LC50	RAT	4HR	Not Available
		LD50	RAT		Not Available
14807-96-6	Talc	LC50	RAT	4HR	Not Available
		LD50	RAT		Not Available
12001-26-2	Mica	LC50	RAT	4HR	Not Available
		LD50	RAT		Not Available
13463-67-7	Titanium Dioxide	LC50	RAT	4HR	Not Available
		LD50	RAT		Not Available

Section 12 -- ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION

No data available.

Section 13 -- DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD

Waste from this product may be hazardous as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR 261.

Waste must be tested for ignitability to determine the applicable EPA hazardous waste numbers.

Incinerate in approved facility. Do not incinerate closed container. Dispose of in accordance with Federal, State/Provincial, and Local regulations regarding pollution.

Continued on page 6

=====
Section 14 -- TRANSPORT INFORMATION

No data available.

=====
Section 15 -- REGULATORY INFORMATION

SARA 313 (40 CFR 372.65C) SUPPLIER NOTIFICATION

CAS No.	CHEMICAL/COMPOUND	% by WT	% Element
100-41-4	Ethylbenzene	0.4	
1330-20-7	Xylene	2	
95-63-6	1,2,4-Trimethylbenzene	6	
71-36-3	1-Butanol	3	

CALIFORNIA PROPOSITION 65

WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.
TSCA CERTIFICATION

All chemicals in this product are listed, or are exempt from listing, on the TSCA Inventory.

=====
Section 16 -- OTHER INFORMATION

This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

The above information pertains to this product as currently formulated, and is based on the information available at this time. Addition of reducers or other additives to this product may substantially alter the composition and hazards of the product. Since conditions of use are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information.



SeaGuard
Marine &
Specialty
Coatings

9.28
SEAGUARD® 6000
MARINE EPOXY

PART A	N11-400		SERIES COLORS
N11R400	RED OXIDE	N11A400	GRAY
N11W400	OFF WHITE	N11B400	BLACK
PART B	N11V400		HARDENER

PRODUCT INFORMATION

Revised 3/06

PRODUCT DESCRIPTION	RECOMMENDED USES																												
<p>SeaGuard 6000 Marine Epoxy is a modified epoxy phenalkamine, formulated specifically for immersion and atmospheric service in marine and industrial environments. SeaGuard 6000 is a versatile anti-corrosive coating that can be applied at temperatures as low as 20°F.</p> <ul style="list-style-type: none"> • Self-priming • Low temperature application • Surface tolerant - damp surfaces • Provides salt water and fresh water immersion resistance 	<p>For use over properly prepared steel substrates, including:</p> <ul style="list-style-type: none"> • Salt water and fresh water immersion resistance • Ballast tanks • Offshore and marine structures • Bilges and wet void areas • Decks and superstructures • Underwater hulls • Fabrication and new construction • Maintenance and repair • As an anti-corrosive primer when used as part of an underwater hull system with anti-fouling coatings 																												
PRODUCT CHARACTERISTICS	PERFORMANCE CHARACTERISTICS																												
<p>Finish: Low Sheen</p> <p>Colors: Red Oxide, Gray, Off-White, Black and other colors available as special order make-n-ship</p> <p>Volume Solids: 67% ± 2%, mixed</p> <p>Weight Solids: 80% ± 2%, mixed</p> <p>VOC (EPA Method 24): Unreduced: <340 g/L; 2.80 lb/gal Reduced 10%: <340 g/L; 2.80 lb/gal</p> <p>Mix Ratio: 4:1 by volume</p> <p>Recommended Spreading Rate per coat: Wet mils: 7.5 - 12.0 Dry mils: 5.0 - 8.0 Coverage: 134 - 215 sq ft/gal approximate</p> <p>NOTE: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.</p> <p>Drying Schedule @ 6.0 mils wet @ 50% RH:</p> <table border="0"> <tr> <td></td> <td>@ 40°F</td> <td>@ 77°F</td> <td>@ 120°F</td> </tr> <tr> <td>To touch:</td> <td>3½ hours</td> <td>2 hours</td> <td>20 minutes</td> </tr> <tr> <td>To handle:</td> <td>12 hours</td> <td>3½ hours</td> <td>40 minutes</td> </tr> <tr> <td>To recoat:</td> <td></td> <td></td> <td></td> </tr> <tr> <td> minimum:</td> <td>12 hours</td> <td>3½ hours</td> <td>40 minutes</td> </tr> <tr> <td> maximum:</td> <td>6 months</td> <td>6 months</td> <td>6 months</td> </tr> <tr> <td>Cure to service:</td> <td>14 days</td> <td>7 days</td> <td>3 days</td> </tr> </table> <p>Pot Life: 8 hours 4 hours 1 hour</p> <p>Sweat-in-time: 30 minutes 15 minutes 5 minutes</p> <p>Shelf Life: 36 months, unopened Store indoors at 40°F to 100°F</p> <p>Flash Point: 116°F Seta Flash</p> <p>Reducer/Clean Up: Reducer R7K104</p>		@ 40°F	@ 77°F	@ 120°F	To touch:	3½ hours	2 hours	20 minutes	To handle:	12 hours	3½ hours	40 minutes	To recoat:				minimum:	12 hours	3½ hours	40 minutes	maximum:	6 months	6 months	6 months	Cure to service:	14 days	7 days	3 days	<p>System Tested: (unless otherwise indicated) Substrate: Steel Surface Preparation: SSPC-SP10 2 cts. SeaGuard 6000 Marine Epoxy @ 6.5 mils dft/ct</p> <p>IMMERSION (Ambient temperature)</p> <ul style="list-style-type: none"> • Salt Water Recommended • Fresh Water Recommended • Ballast Tank Mix Recommended <p>Epoxy coatings may darken or yellow following application and curing.</p> <p>Tested by DET Norske Veritas (DNV). According to DNV Procedure, testing and classification of ballast tank coatings, REV-02. Tested to the DNV Procedure over a Pre-rusted and Hydro-Jetted substrate.</p> <p>Received Highest Obtainable rating B1</p>
	@ 40°F	@ 77°F	@ 120°F																										
To touch:	3½ hours	2 hours	20 minutes																										
To handle:	12 hours	3½ hours	40 minutes																										
To recoat:																													
minimum:	12 hours	3½ hours	40 minutes																										
maximum:	6 months	6 months	6 months																										
Cure to service:	14 days	7 days	3 days																										



SeaGuard
Marine &
Specialty
Coatings

SEAGUARD® 6000

MARINE EPOXY

PART A	N11-400	SERIES COLORS	
N11R400	RED OXIDE	N11A400	GRAY
N11W400	OFF WHITE	N11B400	BLACK
PART B	N11V400	HARDENER	

PRODUCT INFORMATION

RECOMMENDED SYSTEMS

Steel, atmospheric service:

1-2 cts. SeaGuard 6000 @ 5.0 - 8.0 mils dft/ct
1-2 cts. Macropoxy 646 @ 5.0-10.0 mils dft/ct

or

1-2 cts. SeaGuard 6000 @ 5.0 - 8.0 mils dft/ct
1-2 cts. Sherthane 2K @ 2.0-4.0 Mils dft/ct

Steel, immersion service:

2 cts. SeaGuard 6000 @ 5.0 - 8.0 mils dft/ct

Steel, Underwater Hull with Antifouling

2 cts. SeaGuard 6000 @ 5.0 - 8.0 mils dft/ct
2 cts. SeaGuard Antifouling*

*Consult your Sherwin-Williams Marine Representative for the Appropriate Antifouling coating

The systems listed above are representative of the product's use. Other systems may be appropriate.

DISCLAIMER

The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative to obtain the most recent Product Data Information and Application Bulletin.

SURFACE PREPARATION

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure good adhesion.

Refer to product Application Bulletin for detailed surface preparation information.

Minimum recommended surface preparation:

Iron & Steel:
Atmospheric: SSPC-SP2 or SSPC-SP12/NACE No. 5, WJ-3/SC-2
Immersion: SSPC-SP10/NACE 2, 2 mil profile or SSPC-SP-12/NACE No. 5, WJ-2/SC-2

Galvanized, atmospheric: SSPC-SP1

TINTING

Do not tint.

APPLICATION CONDITIONS

Temperature: 20°F minimum, 120°F maximum (air and surface)
At least 5°F above dew point

Material should be at least 40°F for optimal performance.

Relative humidity: 85% maximum

Refer to product Application Bulletin for detailed application information.

ORDERING INFORMATION

Packaging: 1 and 5 gallon containers
1 gallon kit: contains Part A and Part B
5 gallon mix: Part A - 4 gal. in a 5 gal. container
Part B - 1 gallon

Weight per gallon: 11.87 ± 0.2 lb, mixed
may vary with color

SAFETY PRECAUTIONS

Refer to the MSDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

WARRANTY

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.



SeaGuard
Marine &
Specialty
Coatings

9.28 A
SEAGUARD® 6000
MARINE EPOXY

PART A	N11-400	SERIES COLORS	
N11R400	RED OXIDE	N11A400	GRAY
N11W400	OFF WHITE	N11B400	BLACK
PART B	N11V400	HARDENER	

APPLICATION BULLETIN

Revised 3/06

SURFACE PREPARATION

General Surface Preparation

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure good adhesion.

Iron & Steel, Immersion Service:

Remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1. Minimum surface preparation is Near White Metal Blast Cleaning per SSPC-SP10/NACE 2 or SSPC-SP12/NACE No. 5. For SSPC-SP10/NACE 2, blast clean all surfaces using a sharp, angular abrasive for optimum surface profile (2 mils). For SSPC-SP12/NACE No. 5, all surfaces to be coated shall be cleaned in accordance with WJ-2/SC-2 standards. Pre-existing profile should be approximately 2 mils. Light rust bloom is allowed. Remove all weld spatter and round all sharp edges by grinding. Prime any bare steel the same day as it is cleaned.

Iron & Steel, Atmospheric Service:

Minimum surface preparation is Hand Tool Clean per SSPC-SP2 or SSPC-SP12/NACE No. 5. For surfaces prepared by SSPC-SP2, first remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1. For better performance, use Commercial Blast Cleaning per SSPC-SP6/NACE 3, blast clean all surfaces using a sharp, angular abrasive for optimum surface profile (2 mils). For surfaces prepared by SSPC-SP12/NACE No. 5, all surfaces shall be cleaned in accordance with WJ-3/SC-2. Pre-existing profile should be approximately 2 mils. Prime any bare steel the same day as it is cleaned.

Galvanized Steel:

Allow to weather a minimum of six months prior to coating. Solvent Clean per SSPC-SP1 (recommended solvent is VM&P Naphtha). When weathering is not possible, or the surface has been treated with chromates or silicates, first Solvent Clean per SSPC-SP1 and apply a test patch. Allow paint to dry at least one week before testing adhesion. If adhesion is poor, brush blasting per SSPC-SP7 is necessary to remove these treatments. Rusty galvanizing requires a minimum of Hand Tool Cleaning per SSPC-SP2, prime the area the same day as cleaned.

APPLICATION CONDITIONS

Temperature: 20°F minimum, 120°F maximum (air and surface)
At least 5°F above dew point

Material should be at least 40°F for optimal performance.

Relative humidity: 85% maximum

APPLICATION EQUIPMENT

The following is a guide. Changes in pressures and tip sizes may be needed for proper spray characteristics. Always purge spray equipment before use with listed reducer. Any reduction must be compatible with the existing environmental and application conditions.

Reducer/Clean Up Reducer R7K104

Airless Spray

Unit 30:1 Pump
Pressure 2400 - 2800 psi
Hose 1/4" - 3/8" ID
Tip017" - .021"
Filter 60 mesh
Reduction As needed, up to 10% by volume

Conventional Spray

Gun DeVilbiss MBC-510
Fluid Tip E
Air Nozzle 704
Atomization Pressure .. 60-65 psi
Fluid Pressure 5-15 psi
Reduction As needed, up to 10% by volume

Brush

Brush Natural bristle
Reduction Not recommended

Roller

Cover 3/8" woven with phenolic core
Reduction Not recommended

If specific application equipment is not listed above, equivalent equipment may be substituted.



*SeaGuard
Marine &
Specialty
Coatings*

SEAGUARD^{9-28A} 6000

MARINE EPOXY

PART A	N11-400		SERIES COLORS
N11R400	RED OXIDE	N11A400	GRAY
N11W400	OFF WHITE	N11B400	BLACK
PART B	N11V400		HARDENER

APPLICATION BULLETIN

APPLICATION PROCEDURES	PERFORMANCE TIPS																												
<p>Surface preparation must be completed as indicated.</p> <p>Mix contents of each component thoroughly using power agitation. Make certain no pigment remains on the bottom of the can. Then combine 4 parts by volume of Part A with 1 part by volume of Part B. Thoroughly agitate the mixture with power agitation. Allow the material to sweat-in as indicated prior to application. Re-stir before using.</p> <p>If reducer solvent is used, add only after both components have been thoroughly mixed, after sweat-in.</p> <p>Apply paint to the recommended film thickness and spreading rate as indicated below:</p> <p>Recommended Spreading Rate per coat: Wet mils: 7.5 - 12.0 Dry mils: 5.0 - 8.0 Coverage: 134 - 215 sq ft/gal approximate</p> <p>NOTE: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.</p> <p>Drying Schedule @ 6.0 mils wet @ 50% RH:</p> <table border="0"> <tr> <td></td> <td>@ 40°F</td> <td>@ 77°F</td> <td>@ 120°F</td> </tr> <tr> <td>To touch:</td> <td>3½ hours</td> <td>2 hours</td> <td>20 minutes</td> </tr> <tr> <td>To handle:</td> <td>12 hours</td> <td>3½ hours</td> <td>40 minutes</td> </tr> <tr> <td>To recoat:</td> <td></td> <td></td> <td></td> </tr> <tr> <td> minimum:</td> <td>12 hours</td> <td>3½ hours</td> <td>40 minutes</td> </tr> <tr> <td> maximum:</td> <td>6 months</td> <td>6 months</td> <td>6 months</td> </tr> <tr> <td>Cure to service:</td> <td>14 days</td> <td>7 days</td> <td>3 days</td> </tr> </table> <p>Pot Life: 8 hours 4 hours 1 hour</p> <p>Sweat-in-time: 30 minutes 15 minutes 5 minutes</p> <p>Application of coating above maximum or below minimum recommended spreading rate may adversely affect coating performance.</p>		@ 40°F	@ 77°F	@ 120°F	To touch:	3½ hours	2 hours	20 minutes	To handle:	12 hours	3½ hours	40 minutes	To recoat:				minimum:	12 hours	3½ hours	40 minutes	maximum:	6 months	6 months	6 months	Cure to service:	14 days	7 days	3 days	<p>Stripe coat crevices, welds, and sharp angles to prevent early failure in these areas.</p> <p>When using spray application, use a 50% overlap with each pass of the gun to avoid holidays, bare areas, and pinholes. If necessary, cross spray at a right angle</p> <p>Spreading rates are calculated on volume solids and do not include an application loss factor due to surface profile, roughness or porosity of the surface, skill and technique of the applicator, method of application, various surface irregularities, material lost during mixing, spillage, overthinning, climatic conditions, and excessive film build.</p> <p>Excessive reduction of material can affect film build, appearance, and adhesion.</p> <p>Do not mix previously catalyzed material with new.</p> <p>Do not apply the material beyond recommended pot life.</p> <p>In order to avoid blockage of spray equipment, clean equipment before use or before periods of extended downtime with Reducer R7K104.</p> <p>Anti-slip additives, such as H&C SharkGrip®, may be added to the coating to provide some slip resistance. This product should not be used in place of a non-skid finish where safety is a concern.</p> <p>Prior to immersion service, test coating with appropriate holiday detection equipment. Set charge in accordance with manufacturer's recommendation.</p> <p>Refer to Product Information sheet for additional performance characteristics and properties.</p>
	@ 40°F	@ 77°F	@ 120°F																										
To touch:	3½ hours	2 hours	20 minutes																										
To handle:	12 hours	3½ hours	40 minutes																										
To recoat:																													
minimum:	12 hours	3½ hours	40 minutes																										
maximum:	6 months	6 months	6 months																										
Cure to service:	14 days	7 days	3 days																										
<p>CLEAN UP INSTRUCTIONS</p>	<p>SAFETY PRECAUTIONS</p>																												
<p>Clean spills and spatters immediately with Reducer R7K104. Clean tools immediately after use with Reducer R7K104. Follow manufacturer's safety recommendations when using any solvent.</p>	<p>Refer to the MSDS sheet before use.</p> <p>Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.</p>																												
<p>DISCLAIMER</p>	<p>WARRANTY</p>																												
<p>The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative to obtain the most recent Product Data Information and Application Bulletin.</p>	<p>The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.</p>																												

AIR STRIPPER STAND

* ASSUMPTION. (GENERAL)

OPERATING WEIGHT OF AIR STRIPPER : 5,000 lb

MAX AIR STRIPPER WEIGHT (FLOOD w/ H₂O) : 13,000 lb

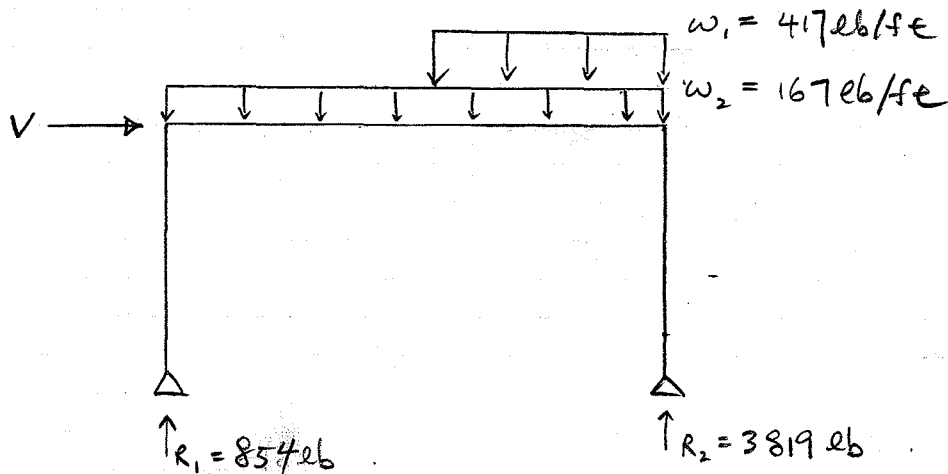
LIVE LOAD : 200 lb × 5 = 1,000 lb

PLATE (1/4" THICK) : 11.26 lb/ft² × 13' × 10' = 1,464 lb

BEAMS : 16 lb/ft × 10' × 4 + 16 lb/ft × 13' × 4 +

16 lb/ft × 3' × 4 + 10.6 lb/ft × 10' × 2 = 1876 lb

o LOAD ON 6.5'H × 13'L FRAME (SCENARIO 1) . D + L + E



* ASSUME DISTRIBUTED LOAD ACROSS THE SPAN

$$w_1 \rightarrow \text{AIR STRIPPER LOAD} = 5,000 \text{ lb} \div 6' \div 2 = 417 \text{ lb/ft}$$

$$w_2 \rightarrow \text{ALL OTHER LOADS} = (1,000 \text{ lb} + 1,464 \text{ lb} + 1,876 \text{ lb}) \div 13 \div 2 = 167 \text{ lb/ft}$$

* SEISMIC LOAD

$$V = \frac{2.5 \times C_a \times I}{R} \times W$$

o BASED ON CSU SEISMIC REQUIREMENTS (ADOPTED 12/8/00, REVISED 7/1/05)

$$N_a = 1.00$$

$$P_{GA} = 0.3$$

$$C_a = 0.36 N_a$$

$$R = 2.9$$

$$I = 1.25$$

(PEAK GROUND ACCELERATION)

(ASSUMED SOIL TYPE SD)

(ALL OTHER SELF-SUPPORTING STRUCTURES)

(HAZARDOUS FACILITY)

$$W = (5,000 \text{ lb} + 1,464 \text{ lb} + 1,876 \text{ lb}) \div 2 = 4,170 \text{ lb}$$

$$V = \frac{2.5 \times 0.36 \times 1.00 \times 1.25}{2.9} \times 4,170 \text{ lb}$$

$$= 16.8 \text{ lb}$$

* USING THE ABOVE LOAD COMBINATION, $M_{\text{max}} = 7 \text{ kip-ft}$
ACROSS THE BEAM $\approx 5.7 \text{ kip-ft}$ @ COLUMN (SEE ATTACHED
- FOR W12X16 BEAM: CALCULATION)

$$\sigma_{\text{allow}} = 0.66 \sigma_y \geq \frac{M_{\text{max}}}{I/c}$$

$$I/c \geq \frac{7,000 \text{ lb-ft} \times 12 \text{ in/ft}}{0.66 \times 36,000 \text{ psi}} = 3.54 \text{ in}^3$$

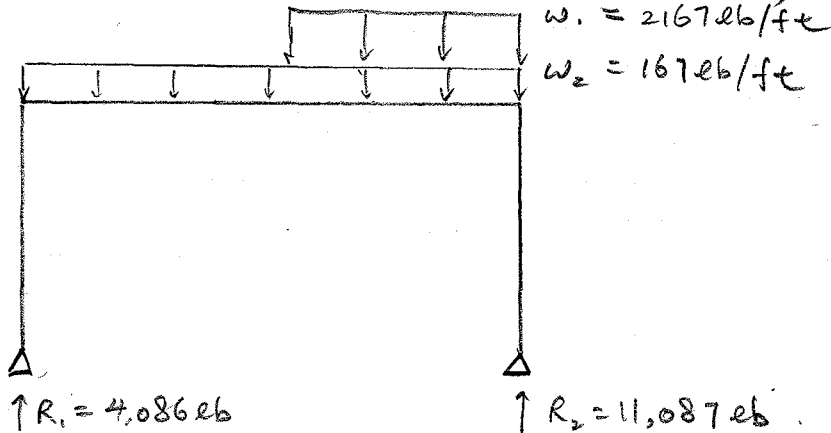
W12X16 HAS I/c OF 17.1 \rightarrow OK!!

- FOR TS 3x3x1/4

$$I/c \geq \frac{5,700 \text{ lb-ft} \times 12 \text{ in/ft}}{0.66 \times 45,000 \text{ psi}} = 2.30$$

TS 3x3x1/4 HAS I/c OF 2.1 \rightarrow NEED BRACING!!

LOAD ON 6.5'H x 13'L FRAME (SCENARIO 2) $D_{\text{max}} + L$



- FOR W12X16 BEAM, $M_{\text{max}} = 25 \text{ kip-ft}$ (SEE ATTACHED CALCULATIONS)
 $I/c \geq \frac{25 \text{ kip-ft} \times 12 \text{ in/ft}}{0.66 \times 36 \text{ kips}} = 12.63 \text{ in}^3 < 17.1 \text{ in}^3 \text{ OK!!}$

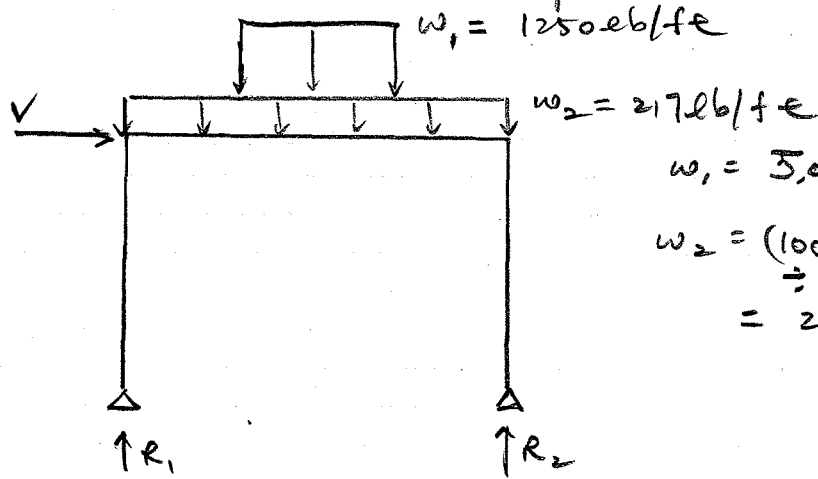
- FOR TS 3x3x1/4

$$I/c \geq \frac{1.8 \text{ kip-ft} \times 12 \text{ in/ft}}{0.66 \times 45 \text{ kips}} = 0.73 \text{ in}^3 < 2.1 \text{ in}^3 \text{ OK!!}$$

Pg 2 of
by OC

o LOAD ON 6.5'H x 10'L FRAME NEAR AIR STRIPPER SIDE.
(SCENARIO 1)

* ASSUME ALL OF AIR STRIPPER LOAD ON THIS FRAME



$$w_1 = 5,000 \text{ lb} \div 4' = 1250 \text{ lb/ft}$$

$$w_2 = \frac{(1000 + 1464 + 1876) \text{ lb}}{\div 10 \div 2} = 217 \text{ lb/ft}$$

$$W = 5,000 \text{ lb} + \frac{(1000 + 1464 + 1876) \text{ lb}}{2} = 7,170 \text{ lb}$$

$$V = \frac{2.5 \times 0.36 \times 1.00 \times 1.25}{2.9} \times 7,170 \text{ lb}$$

$$= 2,781 \text{ lb}$$

- FOR W12x16 BEAM, $M_{max} = 13.3 \text{ kip-ft}$

$$\frac{I}{c} \geq \frac{13.3 \text{ kip-ft} \times 12 \text{ in/ft}}{0.66 \times 36 \text{ kips}} = 6.72 \text{ in}^3 < 17.1 \text{ in}^3 \quad \underline{\underline{\text{OK!!}}}$$

- FOR TS 3x3x1/4, $M_{max} = 9.5 \text{ kip-ft}$

$$\frac{I}{c} \geq \frac{9.5 \text{ kip-ft} \times 12 \text{ in/ft}}{0.66 \times 45 \text{ kips}} = 3.84 > 2.1 \quad \underline{\underline{\text{NEED BRACING!!}}}$$

o LOAD ON 6.5'H x 10'L FRAME NEAR AS SIDE (SCENARIO 2 = $D_{max} + L$)

$$w_1 = 3250 \text{ lb/ft}$$

$$w_2 = 217 \text{ lb/ft}$$

$$V = 0$$

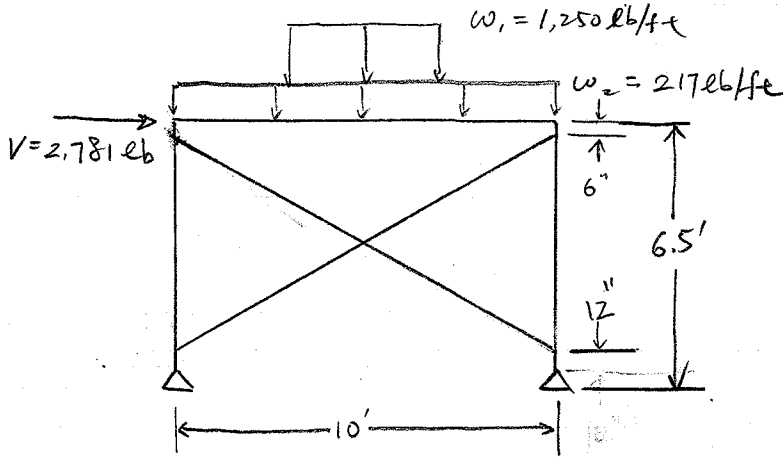
- FOR W12x16 BEAM, $M_{max} = 27.6 \text{ kip-ft}$

$$\frac{I}{c} \geq \frac{27.6 \text{ kip-ft} \times 12 \text{ in/ft}}{0.66 \times 36 \text{ kips}} = 13.94 \text{ in}^3 < 17.1 \text{ in}^3 \quad \underline{\underline{\text{OK!!}}}$$

- FOR TS 3x3x1/4, $M_{max} = 1.1 \text{ kip-ft}$

$$\frac{I}{c} \geq \frac{1.1 \text{ kip-ft} \times 12 \text{ in/ft}}{0.66 \times 45 \text{ kips}} = 0.44 \text{ in}^3 < 2.1 \text{ in}^3 \quad \underline{\underline{\text{OK!!}}}$$

LOAD ON 6.5' H x 10' L FRAME NEAR AIR STRIPPER SIDE W/ BRACING.



- FOR W12x16 BEAM, $M_{max} = 11.6 \text{ kip-ft}$

$$\frac{I}{c} \geq \frac{11.6 \text{ kips-ft} \times 12 \text{ in/ft}}{0.66 \times 36 \text{ kips}} = 5.86 \text{ in}^3 < 17.1 \text{ in}^3 \quad \underline{\underline{OK!!}}$$

- FOR TS 3x3x1/4, $M_{max} = 1.74 \text{ kip-ft}$

$$\text{Max axial stress} = 5.4 \text{ kip} \div 2.59 \text{ in}^2 = 2085 \text{ psi}$$

$$\sigma_{allow} \leq 0.66 \sigma_y = 0.66 \times 45,000 \text{ psi}$$

$$\frac{M_{max}}{I/c} + \text{Max axial stress} \leq 29,700 \text{ psi}$$

$$\frac{1.74 \text{ kip-ft} \times 12 \text{ in/ft}}{2.1 \text{ in}^3} + 2085 \text{ psi} \leq 29,700 \text{ psi}$$

$$12,030 \text{ psi} \leq 29,700 \text{ psi} \quad \underline{\underline{OK!!}}$$

- CHECK LOAD ON BRACING

$$\text{Max COMPRESSIVE LOAD} = 1.3 \text{ kips}$$

* CHOOSE L3x3x3/8 ANGLE, A36 FOR BRACING

$$K = 1.0$$

$$r = 0.913 \text{ in}$$

$$L = 11.2'$$

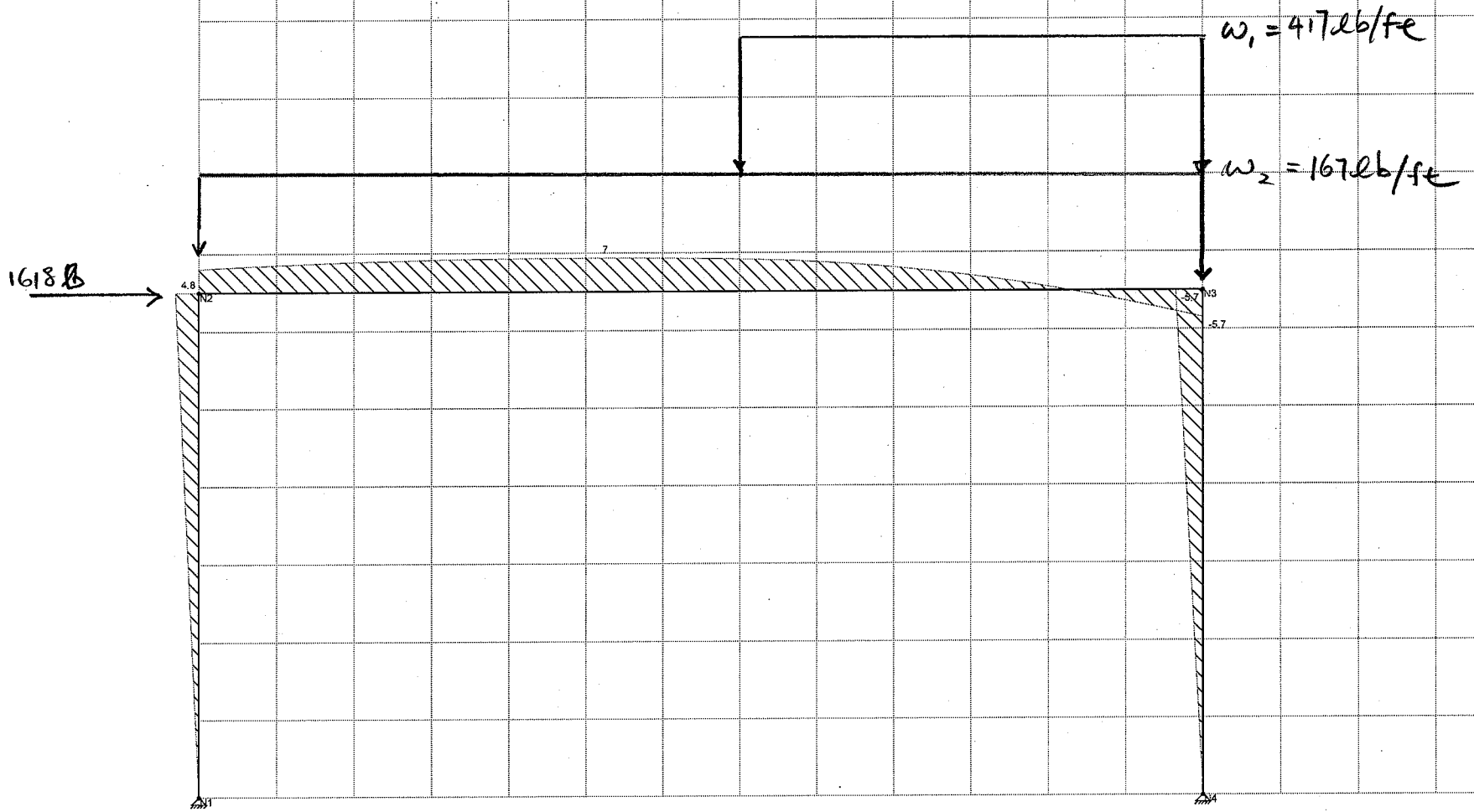
$$\left. \begin{array}{l} K=1.0 \\ r=0.913 \text{ in} \\ L=11.2' \end{array} \right\} \frac{KL}{r} = 147 \rightarrow F_a = 6.91 \text{ ksi} \quad \text{(Table C-36, AISC)}$$

$$\text{Max COMPRESSIVE STRESS} = 1.3 \text{ kips} \div 2.1 \text{ in}^2 = 0.62 \text{ ksi} \quad \underline{\underline{OK!!}}$$

22-141 50 SHEETS
22-142 100 SHEETS
22-144 200 SHEETS



Pg. 4
By oc



MOMENT DIAGRAM .

Member Bending Moments (k-ft)

6.5' H x 13' L FRAME
 D+L+E LOADS

August 29, 2006

10:42 AM

untitled.r2e

Joint Loads/Enforced Displacements

Joint Label	[L]oad or [D]isplacement	Direction	Magnitude (k, k-ft, in, rad)
N2	L	X	1.618

Member Distributed Loads

Member Label	Direction	Start Magnitude (k/ft, F)	End Magnitude (k/ft, F)	Start Location (ft or %)	End Location (ft or %)
M2	Y	-.167	-.167	0	13
M2	Y	-.417	-.417	7	13

Joint Displacements

Joint Label	X Translation (in)	Y Translation (in)	Rotation (radians)
N1	0	0	-2.661e-2
N2	1.432	0	-1.876e-3
N3	1.431	-.004	9.656e-4
N4	0	0	-2.801e-2

Reactions

Joint Label	X Force (k)	Y Force (k)	Moment (k-ft)
N1	-.745	.854	0
N4	-.873	3.819	0
Totals:	-1.618	4.673	

Member Section Forces

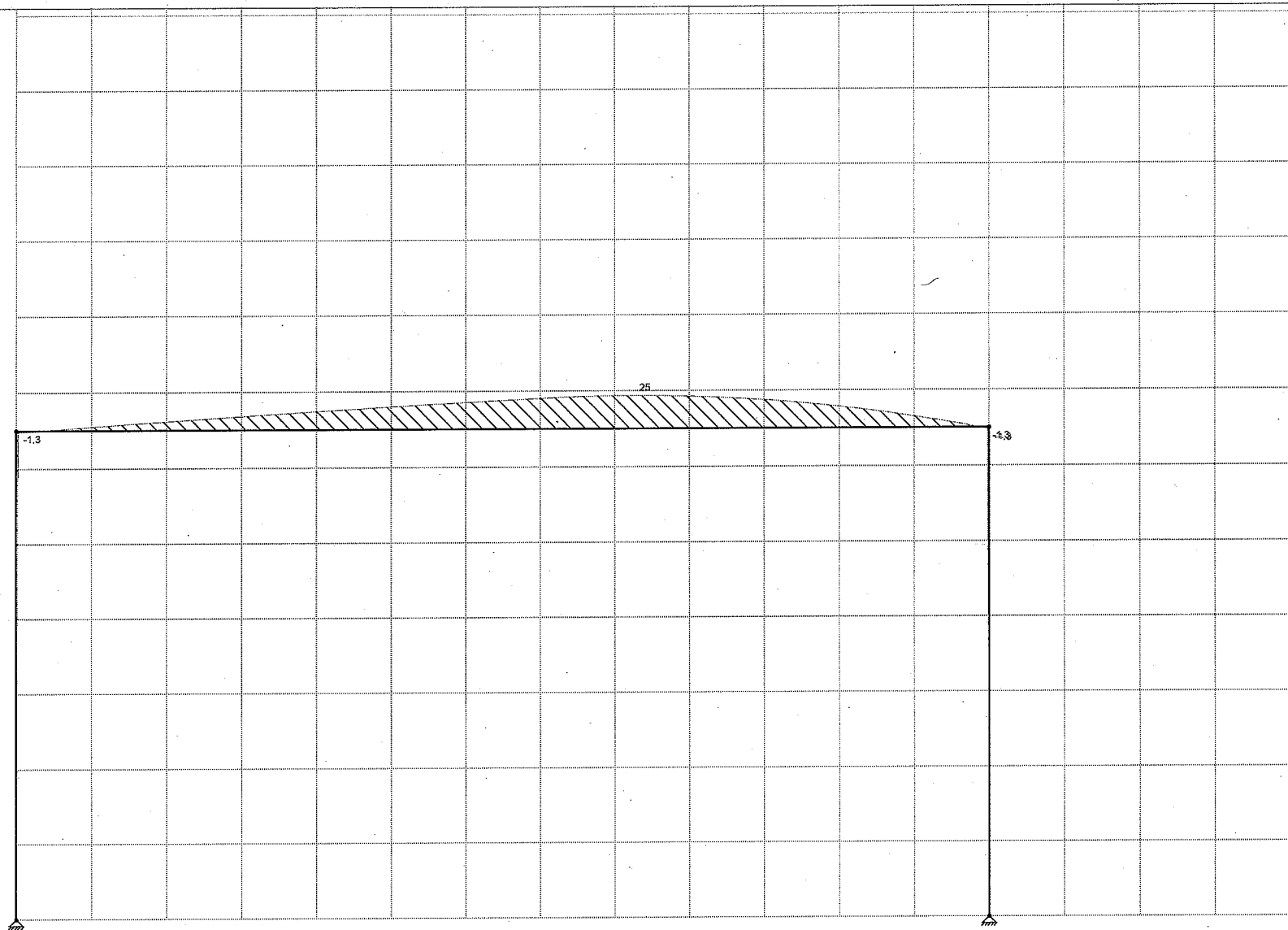
Member Label	Section	Axial (k)	Shear (k)	Moment (k-ft)
M1	1	.854	.745	0
	2	.854	.745	1.211
	3	.854	.745	2.422
	4	.854	.745	3.632
	5	.854	.745	4.843
M2	1	.873	.854	4.843
	2	.873	.311	6.736

Designer :

August 29, 2006
10:43 AM
Checked By: _____

Member Section Forces

Member Label	Section	Axial (k)	Shear (k)	Moment (k-ft)
	3	873	-232	6.865
	4	873	-1.921	3.654
	5	873	-3.819	-5.674
M3	1	3.819	.873	-5.674
	2	3.819	.873	-4.255
	3	3.819	.873	-2.837
	4	3.819	.873	-1.418
	5	3.819	.873	0



MOMENT DIAGRAM

Member Bending Moments (k-ft)

6.5'H x 13'L FRAME
D + L LOADS

August 29, 2006

11:01 AM

Fort Ord Air Stripper Stand 13-foot frame Dmax..

Designer :

August 29, 2006

11:01 AM

Checked By: _____

Member Distributed Loads

Member Label	Direction	Start Magnitude (k/ft, F)	End Magnitude (k/ft, F)	Start Location (ft or %)	End Location (ft or %)
M2	Y	-0.167	-0.167	0	13
M2	Y	-2.167	-2.167	7	13

Joint Displacements

Joint Label	X Translation (in)	Y Translation (in)	Rotation (radians)
N1	0	0	2.816e-3
N2	-0.042	-0.004	-4.005e-3
N3	-0.043	-0.012	5.093e-3
N4	0	0	-1.728e-3

Reactions

Joint Label	X Force (k)	Y Force (k)	Moment (k-ft)
N1	0.206	4.086	0
N4	-0.206	11.087	0
Totals:	0	15.173	

Member Section Forces

Member Label	Section	Axial (k)	Shear (k)	Moment (k-ft)
M1	1	4.086	-0.206	0
	2	4.086	-0.206	-0.334
	3	4.086	-0.206	-0.668
	4	4.086	-0.206	-1.002
	5	4.086	-0.206	-1.336
M2	1	0.206	4.086	-1.336
	2	0.206	3.543	11.062
	3	0.206	3	21.695
	4	0.206	-3.502	22.371
	5	0.206	-11.087	-1.336
M3	1	11.087	0.206	-1.336
	2	11.087	0.206	-1.002

Designer :

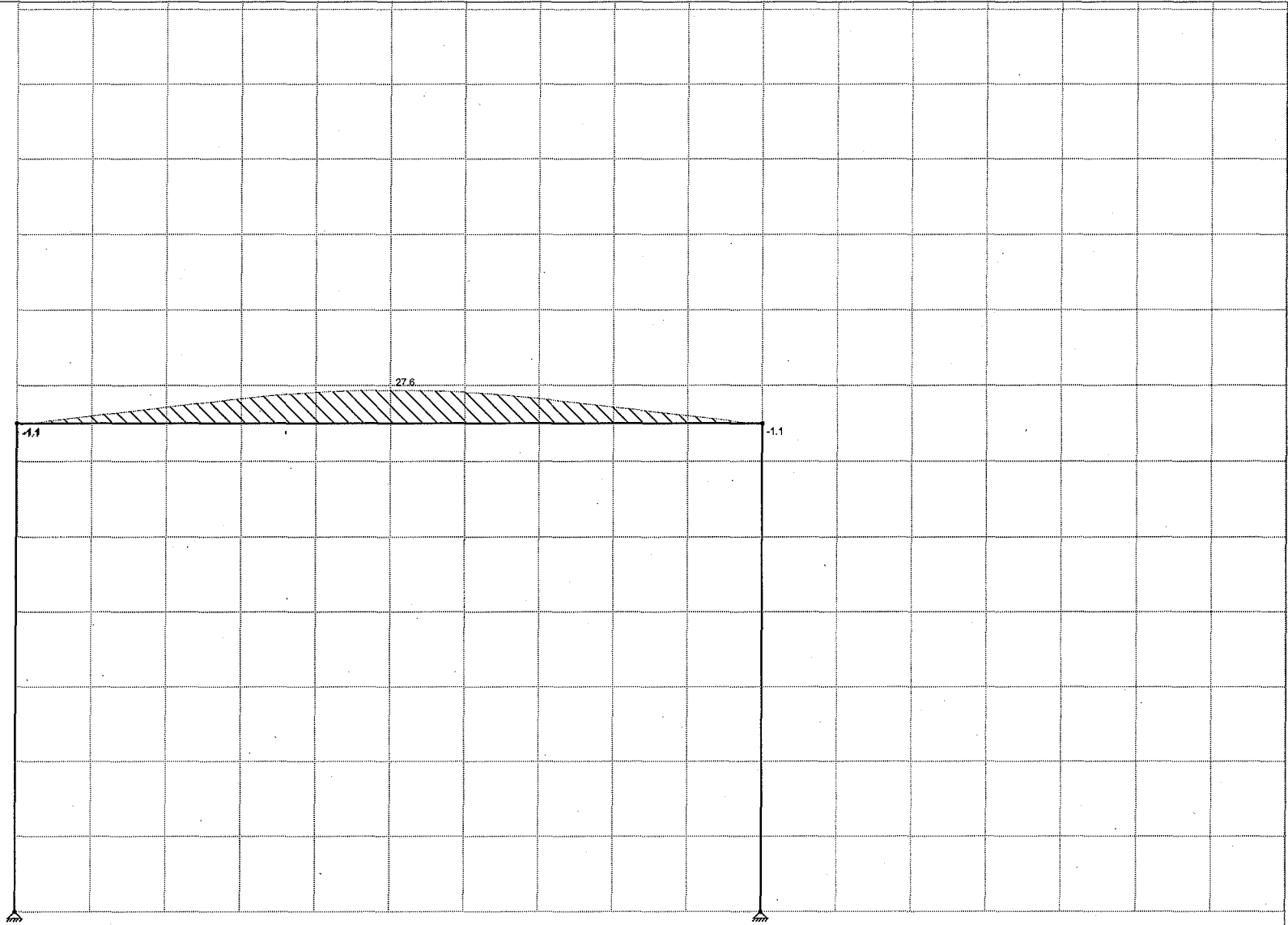
August 29, 2006

11:01 AM

Checked By: _____

Member Section Forces

Member Label	Section	Axial (k)	Shear (k)	Moment (k-ft)
	3	11.087	.206	-.668
	4	11.087	.206	-.334
	5	11.087	.206	0



MOMENT DIAGRAM

Member Bending Moments (k-ft)

6.5' H x 10' L FRAME
D_{max} + L LOADS.

August 29, 2006

11:44 AM

Fort Ord Air Stripper Stand 10-foot frame D_{max}..

Designer :

August 29, 2006

11:44 AM

Checked By: _____

Member Distributed Loads

Member Label	Direction	Start Magnitude (k/ft, F)	End Magnitude (k/ft, F)	Start Location (ft or %)	End Location (ft or %)
M2	Y	-217	-217	0	10
M2	Y	-3.25	-3.25	3	7

Joint Displacements

Joint Label	X Translation (in)	Y Translation (in)	Rotation (radians)
N1	0	0	1.934e-3
N2	0	-.008	-3.87e-3
N3	0	-.008	3.87e-3
N4	0	0	-1.934e-3

Reactions

Joint Label	X Force (k)	Y Force (k)	Moment (k-ft)
N1	.175	7.585	0
N4	-.175	7.585	0
Totals:	0	15.17	

Member Section Forces

Member Label	Section	Axial (k)	Shear (k)	Moment (k-ft)
M1	1	7.585	-.175	0
	2	7.585	-.175	-.284
	3	7.585	-.175	-.568
	4	7.585	-.175	-.852
	5	7.585	-.175	-1.136
M2	1	.175	7.585	-1.136
	2	.175	7.043	17.148
	3	.175	0	27.576
	4	.175	-7.042	17.148
	5	.175	-7.585	-1.136
M3	1	7.585	.175	-1.136
	2	7.585	.175	-.852

August 29, 2006

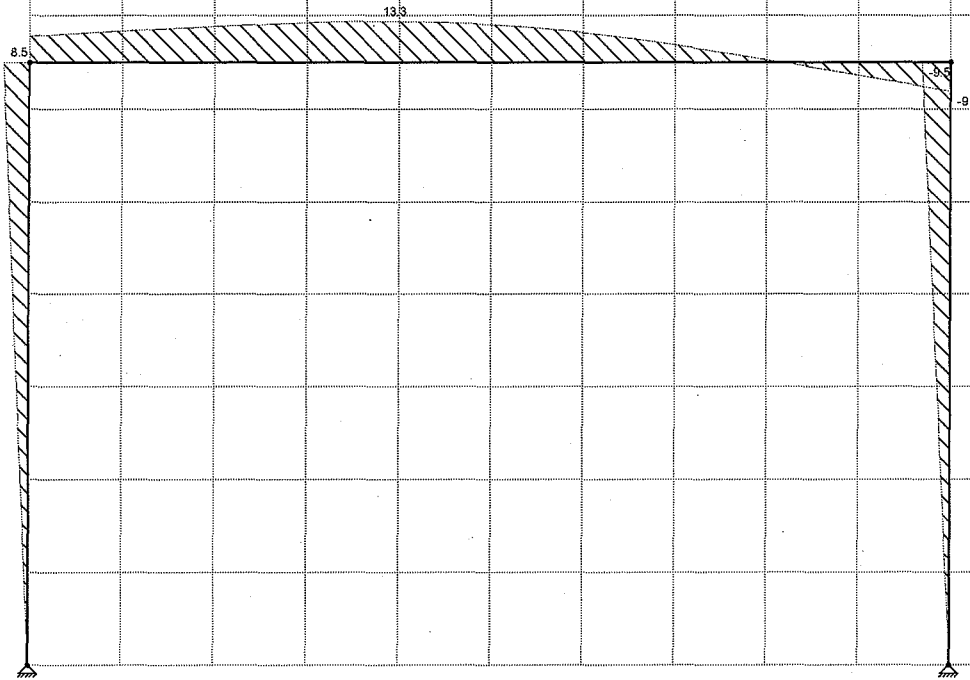
11:45 AM

Checked By: _____

Designer :

Member Section Forces

Member Label	Section	Axial (k)	Shear (k)	Moment (k-ft)
	3	7.585	.175	-568
	4	7.585	.175	-284
	5	7.585	.175	0



MOMENT DIAGRAM

Member Bending Moments (k-ft)

6.5'H x 10'L FRAME
D+L+E LOADS

August 29, 2006

11:33 AM

Fort Ord Air Stripper Stand 13-foot frame Dmax..

10

D+L+E

Designer :

August 29, 2006

11:41 AM

Checked By: _____

Joint Loads/Enforced Displacements

Joint Label	[L]oad or [D]isplacement	Direction	Magnitude (k, k-ft, in, rad)
N2	L	X	2.781

Member Distributed Loads

Member Label	Direction	Start Magnitude (k/ft, F)	End Magnitude (k/ft, F)	Start Location (ft or %)	End Location (ft or %)
M2	Y	-217	-217	0	10
M2	Y	-1.25	-1.25	3	7

Joint Displacements

Joint Label	X Translation (in)	Y Translation (in)	Rotation (radians)
N1	0	0	-4.606e-2
N2	2.46	-0.002	-2.497e-3
N3	2.459	-0.006	9.82e-4
N4	0	0	-4.777e-2

Reactions

Joint Label	X Force (k)	Y Force (k)	Moment (k-ft)
N1	-1.312	1.777	0
N4	-1.469	5.393	0
Totals:	-2.781	7.17	

Member Section Forces

Member Label	Section	Axial (k)	Shear (k)	Moment (k-ft)
M1	1	1.777	1.312	0
	2	1.777	1.312	2.132
	3	1.777	1.312	4.265
	4	1.777	1.312	6.397
	5	1.777	1.312	8.53
M2	1	1.469	1.777	8.53
	2	1.469	1.235	12.295

Designer :

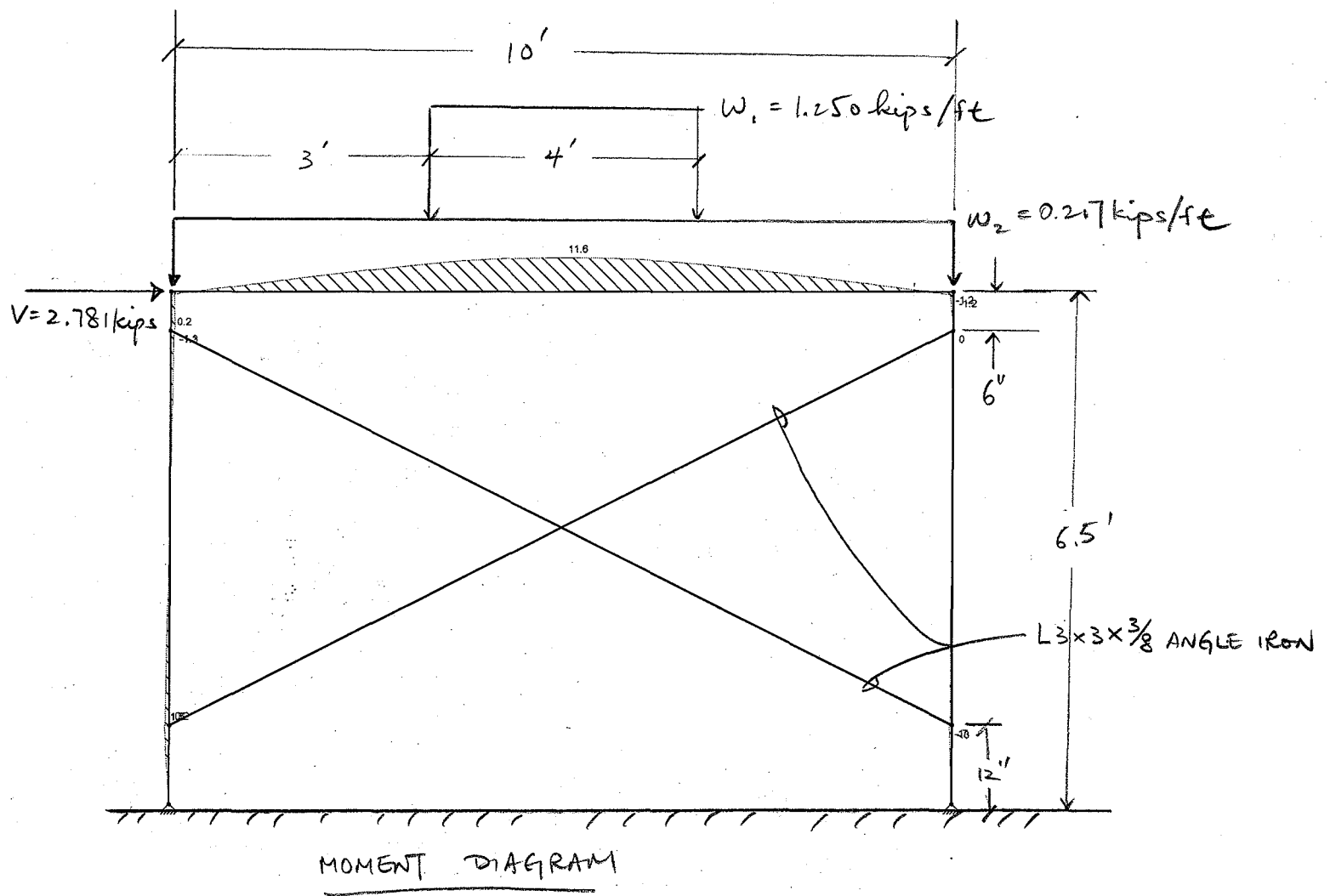
August 29, 2006

11:41 AM

Checked By: _____

Member Section Forces

Member Label	Section	Axial (k)	Shear (k)	Moment (k-ft)
	3	1.469	-1.808	12.204
	4	1.469	-4.85	3.257
	5	1.469	-5.393	-9.547
M3	1	5.393	1.469	-9.547
	2	5.393	1.469	-7.16
	3	5.393	1.469	-4.773
	4	5.393	1.469	-2.387
	5	5.393	1.469	0



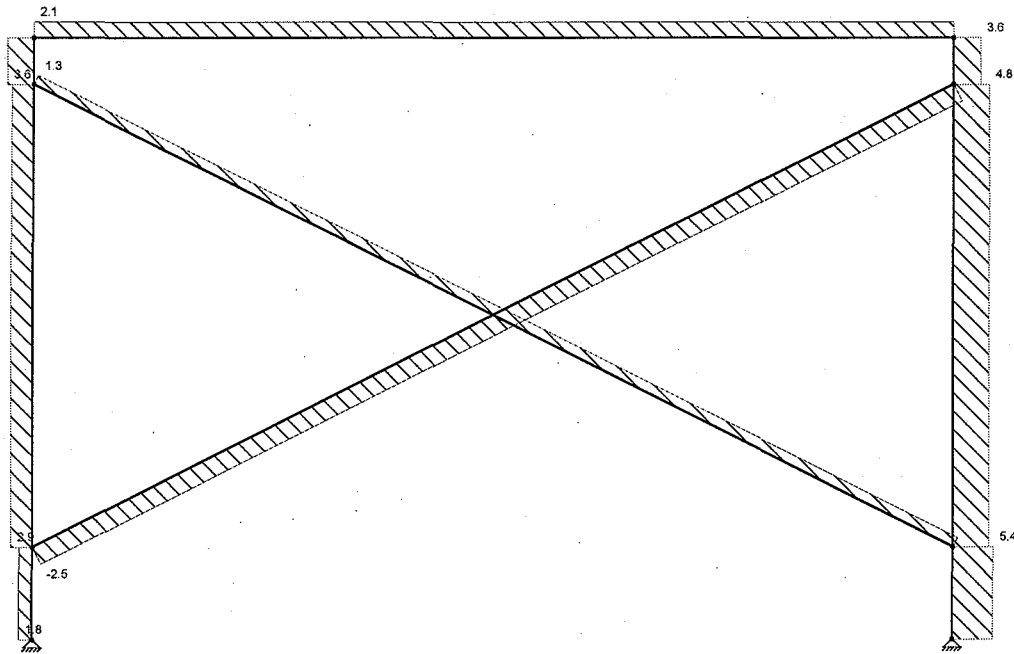
Member Bending Moments (k-ft)

6.5'H x 10'L FRAME w/ BRACING
D+L+E LOADS.

August 29, 2006

1:11 PM

Fort Ord Air Stripper Stand 10-foot frame D+L+..



Member Axial Forces (k)

6.5' H x 10' L FRAME
D + L + E LOADS

August 29, 2006

1:12 PM

Fort Ord Air Stripper Stand 10-foot frame D+L+...

Designer :

August 29, 2006

1:12 PM

Checked By: _____

Joint Loads/Enforced Displacements

Joint Label	[L]oad or [D]isplacement	Direction	Magnitude (k, k-ft, in, rad)
N4	L	X	2.781

Member Distributed Loads

Member Label	Direction	Start Magnitude (k/ft, F)	End Magnitude (k/ft, F)	Start Location (ft or %)	End Location (ft or %)
M4	Y	-217	-217	0	10
M4	Y	-1.25	-1.25	3	7

Joint Displacements

Joint Label	X Translation (in)	Y Translation (in)	Rotation (radians)
N1	0	0	-3.845e-3
N2	.041	0	-2.478e-3
N3	.036	-.003	-7.318e-4
N4	.043	-.003	-1.625e-3
N5	.042	-.005	1.573e-3
N6	.049	-.005	1.049e-3
N7	.034	0	-2.285e-3
N8	0	0	-3.102e-3

Reactions

Joint Label	X Force (k)	Y Force (k)	Moment (k-ft)
N1	-1.74	1.777	0
N8	-1.041	5.393	0
Totals:	-2.781	7.17	

Member Section Forces

Member Label	Section	Axial (k)	Shear (k)	Moment (k-ft)
M1	1	1.777	1.74	0
	2	1.777	1.74	.435
	3	1.777	1.74	.87

Designer :

August 29, 2006

1:12 PM

Checked By: _____

Member Section Forces

Member Label	Section	Axial (k)	Shear (k)	Moment (k-ft)
	4	1.777	1.74	1.305
	5	1.777	1.74	1.74
M2	1	2.929	-512	1.503
	2	2.929	-512	.863
	3	2.929	-512	.222
	4	2.929	-512	-.418
	5	2.929	-512	-1.059
M3	1	3.563	.64	-1.297
	2	3.563	.64	-1.217
	3	3.563	.64	-1.137
	4	3.563	.64	-1.057
	5	3.563	.64	-.977
M4	1	2.141	3.563	-.977
	2	2.141	3.02	7.251
	3	2.141	-.022	11.623
	4	2.141	-3.065	7.138
	5	2.141	-3.607	-1.202
M5	1	3.607	2.141	-1.202
	2	3.607	2.141	-.935
	3	3.607	2.141	-.667
	4	3.607	2.141	-.399
	5	3.607	2.141	-.132
M6	1	4.759	-.112	-.145
	2	4.759	-.112	-.285
	3	4.759	-.112	-.424
	4	4.759	-.112	-.564
	5	4.759	-.112	-.704
M7	1	5.393	1.041	-1.041
	2	5.393	1.041	-.781
	3	5.393	1.041	-.52
	4	5.393	1.041	-.26
	5	5.393	1.041	0
M8	1	1.314	-.051	.238
	2	1.314	-.051	.095
	3	1.314	-.051	-.049
	4	1.314	-.051	-.193
	5	1.314	-.051	-.337
M9	1	-2.53	-.022	.237
	2	-2.53	-.022	.174
	3	-2.53	-.022	.112
	4	-2.53	-.022	.049

Designer :

August 29, 2006

1:12 PM

Checked By: _____

Member Section Forces

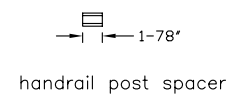
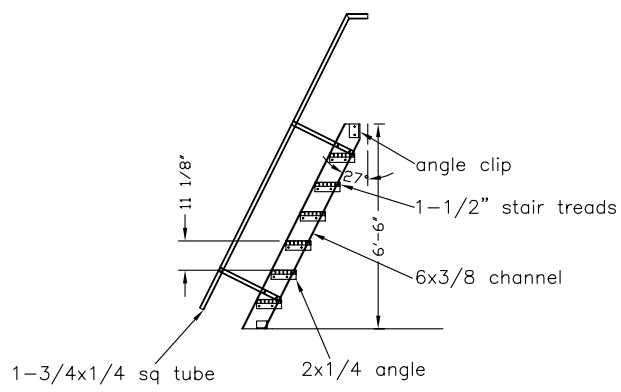
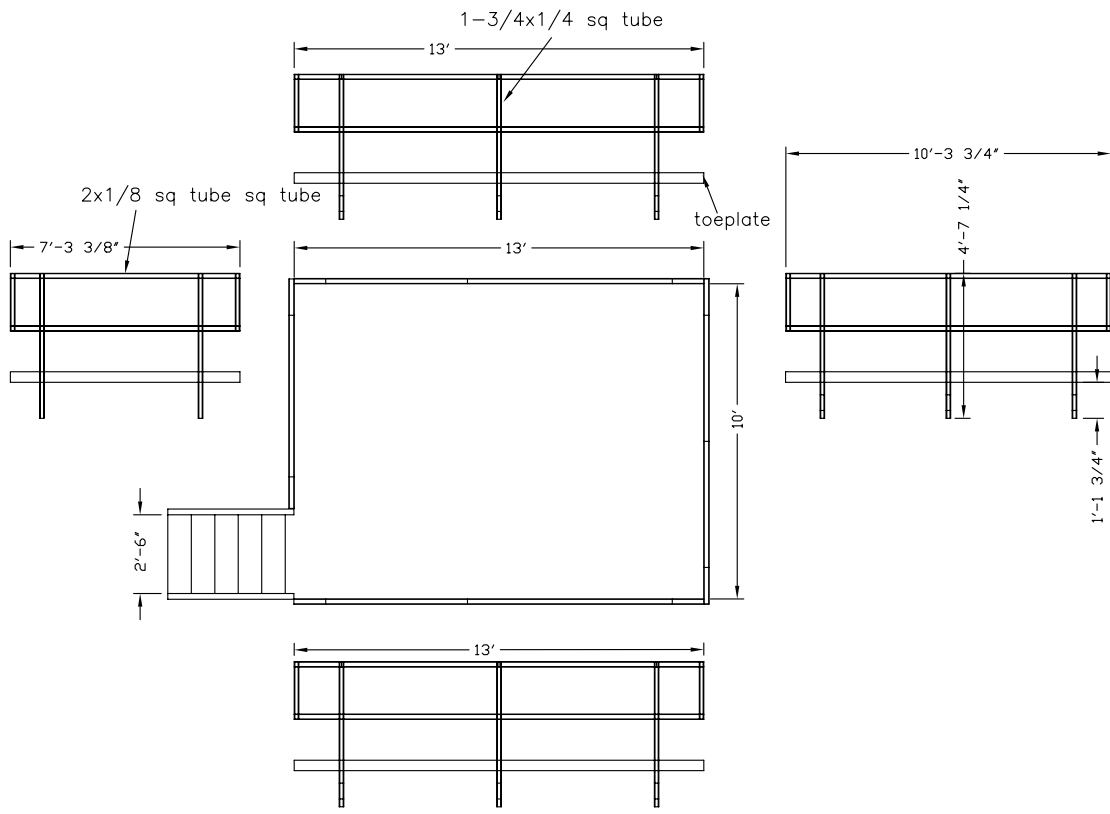
Member Label	Section	Axial (k)	Shear (k)	Moment (k-ft)
	5	-2.53	-.022	-.013

Table C-36
Allowable Stress
For Compression Members of 36-ksi Specified Yield Stress Steel^a

$F_y = 36$ ksi

$\frac{Kl}{r}$	F_a (ksi)	$\frac{Kl}{r}$	F_a (ksi)	$\frac{Kl}{r}$	F_a (ksi)	$\frac{Kl}{r}$	F_a (ksi)	$\frac{Kl}{r}$	F_a (ksi)
1	21.56	41	19.11	81	15.24	121	10.14	161	5.76
2	21.52	42	19.03	82	15.13	122	9.99	162	5.69
3	21.48	43	18.95	83	15.02	123	9.85	163	5.62
4	21.44	44	18.86	84	14.90	124	9.70	164	5.55
5	21.39	45	18.78	85	14.79	125	9.55	165	5.49
6	21.35	46	18.70	86	14.67	126	9.41	166	5.42
7	21.30	47	18.61	87	14.56	127	9.26	167	5.35
8	21.25	48	18.53	88	14.44	128	9.11	168	5.29
9	21.21	49	18.44	89	14.32	129	8.97	169	5.23
10	21.16	50	18.35	90	14.20	130	8.84	170	5.17
11	21.10	51	18.26	91	14.09	131	8.70	171	5.11
12	21.05	52	18.17	92	13.97	132	8.57	172	5.05
13	21.00	53	18.08	93	13.84	133	8.44	173	4.99
14	20.95	54	17.99	94	13.72	134	8.32	174	4.93
15	20.89	55	17.90	95	13.60	135	8.19	175	4.88
16	20.83	56	17.81	96	13.48	136	8.07	176	4.82
17	20.78	57	17.71	97	13.35	137	7.96	177	4.77
18	20.72	58	17.62	98	13.23	138	7.84	178	4.71
19	20.66	59	17.53	99	13.10	139	7.73	179	4.66
20	20.60	60	17.43	100	12.98	140	7.62	180	4.61
21	20.54	61	17.33	101	12.85	141	7.51	181	4.56
22	20.48	62	17.24	102	12.72	142	7.41	182	4.51
23	20.41	63	17.14	103	12.59	143	7.30	183	4.46
24	20.35	64	17.04	104	12.47	144	7.20	184	4.41
25	20.28	65	16.94	105	12.33	145	7.10	185	4.36
26	20.22	66	16.84	106	12.20	146	7.01	186	4.32
27	20.15	67	16.74	107	12.07	147	6.91	187	4.27
28	20.08	68	16.64	108	11.94	148	6.82	188	4.23
29	20.01	69	16.53	109	11.81	149	6.73	189	4.18
30	19.94	70	16.43	110	11.67	150	6.64	190	4.14
31	19.87	71	16.33	111	11.54	151	6.55	191	4.09
32	19.80	72	16.22	112	11.40	152	6.46	192	4.05
33	19.73	73	16.12	113	11.26	153	6.38	193	4.01
34	19.65	74	16.01	114	11.13	154	6.30	194	3.97
35	19.58	75	15.90	115	10.99	155	6.22	195	3.93
36	19.50	76	15.79	116	10.85	156	6.14	196	3.89
37	19.42	77	15.69	117	10.71	157	6.06	197	3.85
38	19.35	78	15.58	118	10.57	158	5.98	198	3.81
39	19.27	79	15.47	119	10.43	159	5.91	199	3.77
40	19.19	80	15.36	120	10.28	160	5.83	200	3.73

^aWhen element width-to-thickness ratio exceeds noncompact section limits of Sect. B5.1, see Appendix B5.
 Note: $C_c = 126.1$



International Grating & Flanges, Inc. P.O. Box 2477 Harrison, Arkansas 72602-2477 Ph: (870) 741-6500 Fax: (870) 741-6512				
REVISIONS		SCALE: NTS DATE: 5/19/06	APPROVED BY:	DRAWN BY: FDB Computer Drafting
NO:	CHANGES MADE:	DATE:	BY:	shaw group
1	DELETED LOADING PLATFORM HANDRAILS	5/24/06	-	
-	-	-	-	
			platform handrails	SHEET NO. 1 OF 1 REV. NO. 1

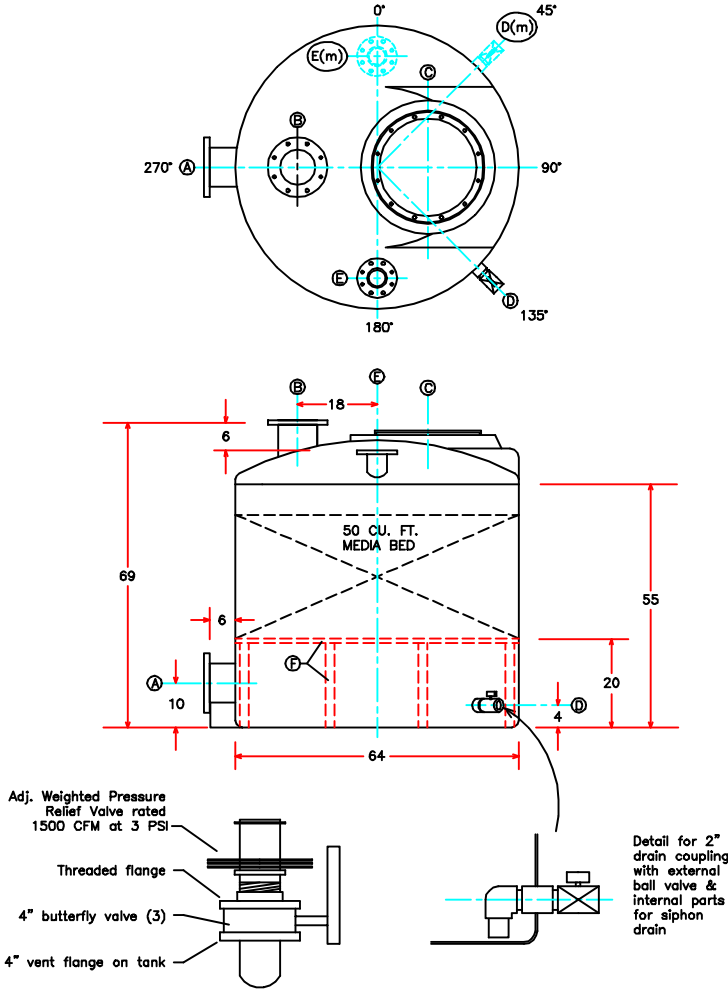
Vapor Phase Treatment

MODEL VS6469PE-3000Z-8F VAPOR SCRUB VESSEL

HDPE MATERIAL, 64" O.D. X 69" O/A HEIGHT, 50 CU. FT. = 3000 LB. ZK6 MEDIA BED, 8" FLANGES FOR PROCESS AIR IN & OUT

Mark	Size	Type	Service/Remarks
A	8"	Flange	Air Inlet on lower sidewall (Allowable external load 50 lbs.)
B	8"	Flange	Air Outlet at top (Allowable external load 50 lbs.)
C	24"	Bolt-on	Solid manway cover with gasket & SS hardware
D *	2"	FNPT	Drain - Full cplg, with internal nipples & elbow For siphon drain (see detail on Elevation dwg). Includes 2" ext. ball valve.
E *	4"	Flange	Vent - Butterfly isolation valve with adjustable weighted Pressure Relief Valve (see detail & Note 3 on Elevation dwg).
F	--	--	Non-metallic media bed support grating, legs & perf. polypropylene top screen. (Details are shown on separate dwg.)

(* Note - One vessel will be supplied with fittings located as shown below. The other vessel will be supplied with a mirror image of the drain (D) and the Vent (E) connections. The fittings to be supplied in mirror image are marked "D(m)" and "E(m)" below.



GENERAL NOTES

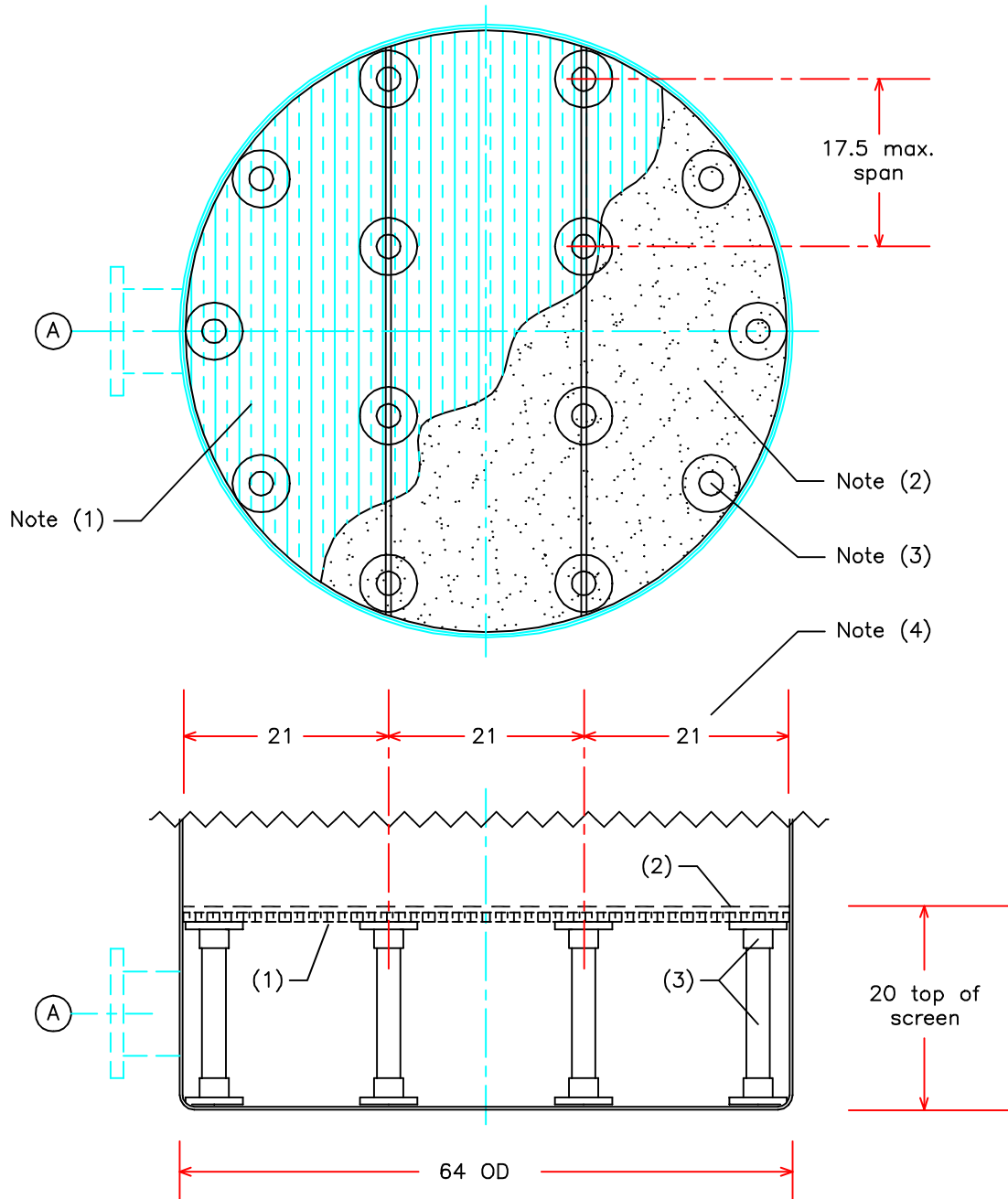
- ZK6 Media (6% potassium permanganate on zeolite) shipped separately packed in 40 lb. palls.
- 304 SS Seismic Restraint System not shown on this drawing. A separate submittal will follow with details on the Seismic Restraint System.
- The HDPE material vessel to be supplied can withstand 3 PSI of air pressure but is not a pressure vessel. Shaw E&I will tag the isolation butterfly valve to remain OPEN (held open by a plastic wire tie if possible). This valve is only to be closed when servicing the PRV. Closing this valve will require a documented procedure (e.g., lock-out, tag-out).

FINAL APPROVAL DRAWING FOR SHAW E&I PO #151968-OP.
FABRICATION CANNOT BEGIN UNTIL DRAWING IS RETURNED
MARKED "APPROVED" OR "APPROVED AS NOTED".

<p>PROPRIETARY DRAWING</p> <p>DRAWING MAY NOT BE USED OR REPRODUCED WITHOUT WRITTEN AUTHORIZATION OF CAMERON GREAT LAKES, INC.</p> <p>ALL DIMENSIONS IN INCHES. TOLERANCE = +/- 0.25 IN.</p>				<p>CAMERON GREAT LAKES, INC. 2335 NW 29th AVE PORTLAND, OR 97210 TEL: 800-777-4044 FAX: 503-225-0137</p>		
B	02/24/06	JMB	REVISED PER SHAW E&I COMMENTS	DRAWN	JMB	<p>TITLE: GENERAL ARRANGEMENT MODEL VS6469PE-3000Z-8F HDPE VAPOR SCRUB VESSEL</p>
A	01/30/06	JMB	ISSUE FOR APPROVAL FOR SHAW E&I	CHECKED	RAH	
--	05/23/00	JMB	ORIGINAL ISSUE	APPROVED	JMB	
REV.	DATE	BY	REMARKS	SCALE	N.T.S.	DWG. NO. VS6469PE.3000Z.8F

Internal details & notes for media bed bar grating, legs & perforated top screen

- (1) – Molded fiberglass bar grating, 1.5" x 0.25" bearing bars on 1.5" centers. Rated for 218 lb./sq.ft. uniform load with 3 ft. bearing bar span. Actual loading is 139 lb./sq.ft. with 17.5" maximum span.
- (2) – Polypropylene perforated top screen, 0.188" thick with 0.094" holes on 0.3125" staggered centers.
- (3) – Qty (14) Support legs: 2" PVC Sch. 80 pipe with 2" flanges at top & bottom.
- (4) – Bar grating and top screen cut in 21" width sections to fit through 24" vessel manway.



CGL Sales Order
No. 40852

Shaw E&I PO
No. 151968 OP

PROPRIETARY DRAWING			
DRAWING MAY NOT BE USED OR REPRODUCED WITHOUT WRITTEN AUTHORIZATION OF CAMERON GREAT LAKES., INC.			
ALL DIMENSIONS IN INCHES. TOLERANCE = +/- 0.25 IN.			
REV.	DATE	BY	REMARKS
A	02/24/06	JMB	ISSUE FOR RECORD
--	05/23/00	JMB	ORIGINAL ISSUE



CAMERON GREAT LAKES, INC.

2335 NW 29th AVE PORTLAND, OR 97210
TEL: 800-777-4044 FAX: 503-225-0137

DRAWN: JMB
CHECKED: RAH
APPROVED: JMB

TITLE: MEDIA BED SUPPORT DETAILS
MODEL VS6469PE-3000Z-8F
HDPE VAPOR SCRUB VESSEL
SCALE: N.T.S. DWG NO. VS6469PE.3000Z.8F.INT

CAMERON/GREAT LAKES INC.
2335 NW 29th Ave. Portland, OR 97210
PHONE: (503) 225-0501

MATERIAL SAFETY DATA SHEET

SECTION I - MATERIAL IDENTIFICATION AND INFORMATION

MANUFACTURER: Cameron/Great Lakes, Inc.
2335 NW 29th Ave.
Portland, OR 97210

EMERGENCIES: (503) 225-0501

PRODUCT IDENTIFICATION: KOR48/ZK6
CHEMICAL FORMULA: KMNO₄

SECTION II - DEPARTMENT OF TRANSPORTATION INFORMATION

Proper Shipping Name: Natural Zeolite, clinoptilolite
ID Number: Not regulated by DOT

Notice: KF600 media contain 1 - 2% manganese compounds (CAS Reg. No. N/A) as part of the mixture and is subject to the reporting requirements of Section 313 of Title III Superfund Amendments and Reauthorization Act of 1986 and 40CFR Part 372.

SECTION III - HAZARDOUS INGREDIENTS

<u>Material or Component</u>	<u>CAS NO. *</u>	<u>%</u>	<u>Hazard Data</u>
Potassium permanganate KmnO ₄	7722-64-7	6%	PEL** C**** 5mg Mn Per cubic meter of air. TLV-TWA*** 5mg Mn per cubic meter of air.
Natural Zeolite (clinoptilolite)	12173-10-3 [†]	80%	PEL N/A TLV-TWA N/A

* Chemical Abstract Service Number.

** OSHA Permissible Exposure Limit, manganese compounds (expressed as Mn).

*** American Conference of Governmental Hygienist, 1988/1989, TLV-TWA = the time weighted average concentration for a normal 8 hour workday and a 40 hour workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect.

**** Ceiling Exposure Limit or maximum exposure concentration not to be exceeded under any circumstances.

[†] All natural zeolites exempted from tolerance as a solid diluent or carrier under 40 CFR 180.1001.

SECTION IV - PHYSICAL / CHEMICAL CHARACTERISTICS

Boiling Point	N/A	Specific Gravity	2.3-2.5
Vapor Pressure (mm Hg and Temperature)	N/A	Melting Point	N/A
Vapor Density (Air = 1)	N/A	Evaporation Rate (Butyl Acetate = 1)	N/A
Solubility in Water KmnO ₄ - yes, Zeolite - no		Water Reactive	N/A
Appearance and Odor	Purple Granules, Odorless		

SECTION V – FIRE AND EXPLOSION HAZARD DATA

Flash Point Noncombustible Auto-Ignition N/A Flammability N/A LEL N/A UEI N/A
(Method used) Temperature Limits

Extinguisher Media N/A

Special Fire Fighting Procedures N/A

Unusual Fire and Explosion Hazards N/A

SECTION VI – REACTIVITY HAZARD DATA

STABILITY **Conditions to Avoid**
____ Unstable Protect containers against puncture and physical
____ X Stable damage. Keep in dry area. Avoid exposure to water.

Incompatibility
Material to Avoid Strong Acids and oxidizable matter

Hazardous
Decomposition Products In contact with hydrochloric acid, toxic chlorine gas will evolve.

HAZARDOUS POLYMERIZATION **Conditions to Avoid**
____ May Occur ____ X Will Not Occur NONE

SECTION VII – HEALTH HAZARD DATA

PRIMARY ROUTES ____ Inhalation ____ Ingestion CARCINOGEN ____ NTP ____ OSHA
OF ENTRY ____ Skin Absorption ____ X Not Hazardous LISTED IN ____ IARC ____ X Not Listed

HEALTH HAZARDS Acute May be irritating to body tissue upon contact
Chronic Prolonged inhalation of manganese compounds above
threshold limit may cause lung irritation and central nervous
system disorders.

Signs and Symptoms May stain body tissue
of exposure

Medical Conditions
Generally Aggravated by Exposure Open wounds, burns, and mucous membranes

**EMERGENCY FIRST AID PROCEDURES – Seek medical assistance for further treatment,
observation and support if necessary.**

Eye Contact Immediately flush with large amounts of water for 15 minutes.

Skin Contact Immediately flush with soap and water.

Inhalation Leave contaminated area.

Ingestion Drink several glasses of water or milk. Seek medical attention.

SECTION VIII – CONTROL AND PROTECTIVE MEASURES

Respiratory Protection: (Specify Type)	Treat as low level nuisance dust, use NOSH/MSA#TC-21C-132
Ventilation to be used	Mechanical (general)
Protective Gloves:	Recommended
Eye Protection:	Safety glasses
Other Protective Clothing and Equipment	Regular work clothing.
Hygienic Practices:	Wash hand before eating, wash contaminated clothing.

SECTION IX – PRECAUTIONS FOR SAFE HANDLING AND USE/LEAK PROCEDURES

Steps to be Taken if Material is Spilled or Released	Sweep up granules, flush floors with water into sewer if permitted by Federal, state and local regulations.
Waste Disposal Methods	Reduce potassium permanganate with hypo (10% sodium thiosulfate) solution and deposit in permitted landfill.
Precautions to be taken in Handling and Storage	Protect containers against physical damage. Store in cool dry area in closed containers.
Other Precautions and/or Special Hazards	Avoid exposure to water and contaminated air, otherwise the media is rendered useless



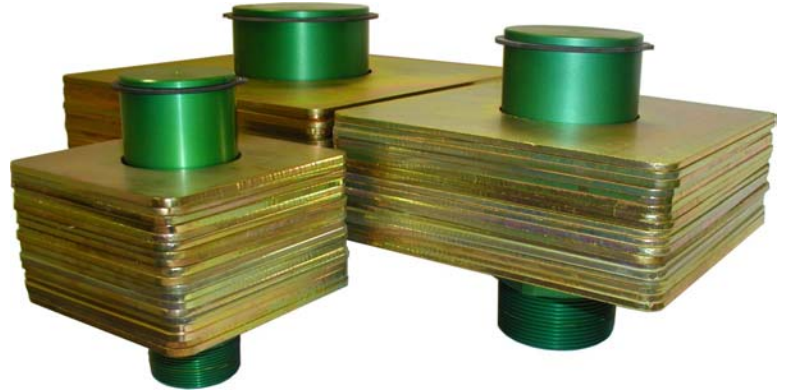
Bridging the Gap
Between Technology and Industry

WEIGHTED RELIEF VALVE

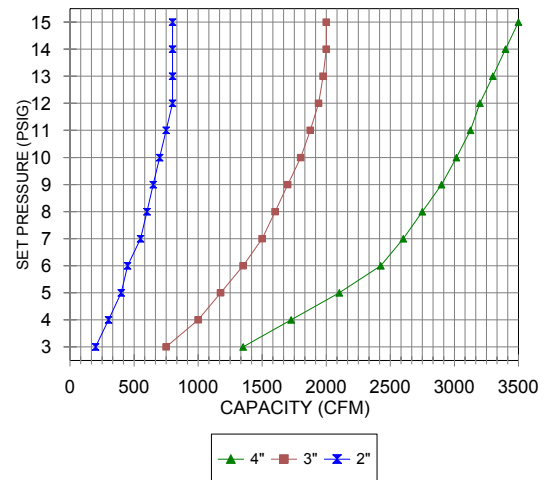
We offer our weighted pressure relief valve 2", 3", and 4" sizes for capacities through 3400 CFM. We couple an elementary design with a high quality anodized and heat-treated aluminum construction to offer reliable performance and simple calibration. Proven design ensures years of reliable service.

Features Include:

- Anodized Aluminum construction for years of trouble-free service;
- 2", 3", and 4" models have standard MPT connections;
- Valves available from 1 PSIG through 29 PSIG with a calibrated $\frac{1}{2}$ PSIG increment per removable disc;
- Simple operation. Line pressure naturally displaces the weighted cap upwards and off the valve seat. As the pressure increases, the valve exposes more vent area for higher flow;
- High flow-through capacity;
- Valve automatically seats itself when the pressure is removed;
- All operating surfaces are machined and the entire valve is heat treated and anodized for the highest quality;
- No maintenance required;
- Simple method of opening and closing insures that the valve is virtually chatter-free;
- Retainer ring ensure valve settings are not tampered with.



CAPACITY CHART



Pathfinder Systems, Inc.

6301 Deramus Ave. • Kansas City, MO 64120 • (816) 741-0282 • FAX: (816) 587-0282
E-mail: mail@pathfindersystems.net



Established 1975

CAMERON GREAT LAKES, INC.

ACTIVATED CARBON & FILTRATION MEDIA - WATER & GAS TREATMENT EQUIPMENT & SYSTEMS

Corporate Office: 2335 NW 29th Ave., Portland, OR 97210 Tel: 800-777-4044 (Fax 503-225-0137)
Eastern Regional Office: 104 W. Fairview Ave., Langhorne, PA 19047 Tel: 215-752-2246 (Fax 2247)
For additional information on CGL products & services, please visit our website: camerongreatlakes.com

February 23, 2006

Ref. No. 60223-SE&I-Ft. Ord
Via FedEx Next Day Air- Page 1 of 1
FedEx Air Bill No. 851779589471

Ron Hayashi, Project Engineer
Shaw E&I
4005 Port Chicago Highway
Concord, CA 94520

Tel. 925-288-2142

Re: **Shaw PO No. 151968 OP - CGL Sales Order No. 40852 - HDPE Material Vapor Units**


Ron:

This letter follows up on our telephone conversation this afternoon. Enclosed is a set of the State of California PE stamped calculations for seismic zone 4 restraint clips for the HDPE material vapor treatment vessels to be provided on this order. After final order entry engineering, we were able to determine that separate cables over the top of the tanks were not required to meet the desired seismic restraint condition. Please review these calculations at your earliest convenience as they are an integral part of the drawing approval process as noted in your recent email..

I will forward the revised CGL vessel drawing to you via email on 02-24-06. The revised drawing will reflect the changes requested in your drawing review email dated 01-30-06.

Please call if you have any questions or need additional information.

Regards,



Joseph M. Battaglia, VP, Engineering
Cameron Great Lakes, Inc.
Eastern Regional Office

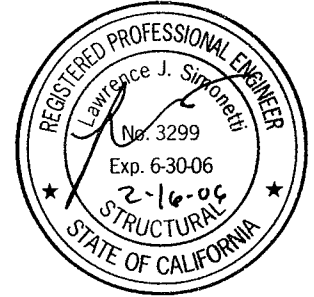
Enclosure - PE Calculation Package

Copy to: CGL, Portland, OR

Copy for: Ron Hayashi @ SHAW EDZ

LANE ENGINEERS, INC.

979 N. Blackstone
Tulare, CA 93274
Phone: (559) 688-5263
FAX: (559) 688-8893



UPRIGHT TANK LATERAL RESTRAINTS

Customer: Former Fort Ord No. 4
Installation Location: All Pro Lane; Marina, CA
Tank Manufacturer: Poly Processing Company

By: L. J. Simonetti

Date: February 14th, 2006

Job No.: 06050

INDEX

CALCULATIONS:

Governing Code: 1997 Uniform Building Code
Site Location: Zone 4; Greater than 2km from a "Source Type B" fault.
Design Parameters: Zone 4; Assumes tank is located closer than 2km from a "Source Type B" fault or greater than 5km from a "Source Type A" fault.

Calculations for Model 41000755 (755 Gal. Upright Closed-top) CT-19.5
Indoor Calculation Package I-1 → I-4
Capacity Calculations for AC-11 Base Clip 11-1 → 11-4

DRAWINGS:

DRAWING NO.

P13.1

DATE

09/01/98

RE: SHAW P.O. NO. 151968 OP
CGL SALES ORDER NO. 40852

FROM:

Joseph M. Battaglia, VP, Engr'g
CAMERON GREAT LAKES, INC.
Eastern Office - 104 W. Fairview Ave.
Langhorne, PA 19020
Tel 215-752-2246 (fax 2247)

POLY PROCESSING COMPANY
LATERAL RESTRAINT SYSTEM FOR UPRIGHT TANKS
1997 UNIFORM BUILDING CODE

LANE ENGINEERS, INC.
P.O. Box 1059, Tulare, CA 93275
PH: (559) 688-5263 -- FAX: (559) 688-8893

Sheet: CT-19.5
Date: 2/14/2006
By: DKA

TANK TYPE: Closed-Top

TANK No. 41000755 (755 Gal.)

Max. Capacity = 756 Gal.
Diameter = 5.333 ft.
Height = 5.416 ft.
T (U.B.C.) = 0.0710 seconds (Method A) ✓
T (API 650) = 1.3394 seconds (First Sloshing Mode)

WEIGHTS (S. G. = 1.9)

Empty = 18 lbs. ?
Contents = 11,983 lbs. ?
Total Weight = 12,001 lbs.
Cables = 4 (4 through 12)
Base Clips = 4 (4, 6, 8, 10, 12)

WIND LOADING (100 MPH, Expos. D, C_q = 0.80, I = 1.15; Tank Empty):

Pressure 1 = 32.74 psf (0' < height <= 15')
P_w = 946 lbs.
OTM = 2,561 ft.-lbs.
RM = 3,841 ft.-lbs. (Includes surcharge due to cable tension)
RM/OTM = 1.5



SEISMIC LOADING (ρ = 1.0, R = 2.9, I = 1.25, Soil Type S_d; Tank Full):

Seismic Zone = 4 (1, 2A, 2B, 3 or 4)
EQ Source = B (A, B or C: Applies to Seismic Zone 4)
Dist. to Source = 2 km (2, 5, 10 or 15: Applies to Zone 4)
E = ρ * V = 5,297 lbs. (U.B.C. Equ. 34-3 Governs)
E / 1.4 = 3,784 lbs. (ASD, U.B.C. Section 1612.3.2, Equ. 12-13)
OTM = 10,246 ft.-lbs.
RM = 27,200 ft.-lbs. (Includes 0.85 factor for vertical EQ considerations)
RM/OTM = 2.6548

Ca = 0.484 ✓
Cv = 1.024
Na = 1.100 ? (Zone 4)
Nv = 1.600 (Zone 4)

REQUIRED BASE CLIP RESTRAINTS (F'c = 2500 PSI):

CASE 1: TANK EMPTY + WIND
Maximum Cable Tension 356 lbs.
Maximum Shear per Clip 946 lbs.
Anchor Bolt Shear 473 lbs.
Anchor Bolt Tension 617 lbs.

BASE CLIP STRESS:
Bend. Stress = 8,624 psi -- O.K.

CONCRETE BEARING STRESS:
Bear. Stress = 267 psi -- O.K.

CASE 2: TANK FULL + SEISMIC
Kinetic Friction Factor 0.27
Maximum Shear per Clip 543 lbs.
Anchor Bolt Shear 272 lbs.
Anchor Bolt Tension 252 lbs.

ANCHORS:
For 'HILTI' 5/8" dia. 'Kwik Bolt II' w/ 4" Embed :
Allow. V = 3,229 lbs.
Allow. T = 1,020 lbs.
Comb. Stress = 0.4728 -- O.K.

4 - AC11 BASE CLIPS (L4x3x5/16 x 8") w/ 'HILTI' 5/8" DIA. "KWIK BOLT II" EXPANSION-TYPE ANCHORS (STD OR STAINLESS) w/ 4" MINIMUM EMBEDMENT INTO CONCRETE. INSTALL PER I.C.B.O. REPORT No. 4627. SPECIAL INSPECTION IS NOT REQ'D.
4 - 1/4 in. DIA. CABLES FOR OUTDOOR INSTALLATIONS.

Indoor Calculation Package "I"

Manufacturer:

Poly Processing Company
8055 South Ash Street
French Camp, CA 95231
PH: (209) 982-4904

Engineer:

Lane Engineers, Inc.
979 North Blackstone Ave
Tulare, CA 93277
PH: (559) 688-5263



Design Criteria, Unless Noted Otherwise:

Uniform Building Code (Published by I.C.B.O.).....	1997 Edition
Wind Loading.....	Not Applicable -- Indoors
Seismic Loading.....	Zone 4, Source B, w/in 2 Km (See Note No. 3 below)
Tank Contents.....	Hazardous
Specific Gravity of Tank Contents.....	1.90
Carbon Structural Steel.....	ASTM A36
Stainless Structural Steel.....	ASTM A276, Type 304

NOTES:

1. The purchaser shall be responsible for verifying local building code requirements and/or project specifications. Additional engineering assistance may be required to comply with local codes or individual project specifications.
2. Design of the tank foundation is beyond the scope of these calculations.
3. The *calculation data sheet* attached herewith reflects the design loading on the tank when it is located in Seismic Zone 4 within 2 kilometers of a fault classified as "Seismic Source B". *Special engineering assistance is required if the tank is located in Seismic Zone 4 within 5 kilometers of a fault classified as "Seismic Source A"*. Location and layout of actively-known faults in the State of California is shown in the I.C.B.O. publication "Maps of Known Active Fault Near-Source Zones in California & Adjacent Portions of Nevada".

LANE ENGINEERS, INC.

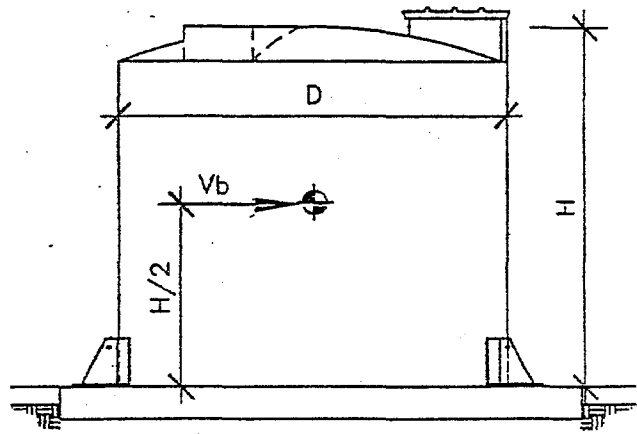
Post Office Box 1059 • Tulare, California 93275 • (209) 688-5263
FAX - (209) 688-8893

PROJECT	1997 U.B.C. LATERAL RESTRAINT SYSTEM	SHEET	1-2	OF	4
CLIENT	POLY PROCESSING COMPANY	JOB NO.	98098		
BY	DKA	CHKD BY	DKA	DATE	August 1, 1998

1997 U.B.C. --- INDOOR TANK INSTALLATION PACKAGE

1. Wind Loading (Chapter 16, Division III):

- a) Not applicable -- Indoor installation.
- b) The tank must be located within a structure that has been designed to withstand applicable wind forces per the 1997 Uniform Building Code.



2. Seismic Loading (Chapter 16, Division IV):

“Non-Building Structure”, flexible [§1634.4 & 1634.5].
Design parameters are noted on the cover page. Determine the period of the tank, comparing U.B.C. Method A with the “First Sloshing Mode” period as derived from Standard 651 by the American Petroleum Institute:

U.B.C. Method A [§1630.2.2.1]:
 $T = Ct (H)^{3/4}$

First Sloshing Mode [A.P.I. 650, §E3.3.2 & Figure E-4]:
 $T = k (D)^{1/2}$

Typical parameters: $\rho = 1.0$ [§1634.1.2], $R=2.9$ [Table 16-P], Soil profile S_D [§1629.3], Max. $N_a = 1.1$ [§1629.4.2], $I = 1.25$ [Table 16-K] & $Z = 0.40$ [Table 16-I].

Base shear equations:

- ① $V_b = (C_v * I * W) / R * T$, where $C_v = 0.64 * N_v$: Standard equation [U.B.C. Eq. 30-4].
- ② $V_b = (2.5 * C_a * I * W) / R$, where $C_a = 0.44 * N_a$: Need not exceed this value [U.B.C. Eq. 30-5].
- ③ $V_b = 0.56 * C_a * I * W$: Must be greater than this value [U.B.C. Eq. 34-2]. ✓
- ④ $V_b = (1.6 * Z * N_v * I * W) / R$: For seismic zone 4, must also be greater than this value [U.B.C. Eq. 34-3]. ✓

From Section 1630.1.1: $E = \rho * E_h + E_v$
For allowable stress design, $E_v = 0$ and $E_h = V_b$ (see above)

b) Stability:

$M_{ot} = V_b * H/2$
 $M_r = W * D/2 * 0.85$
 → Using a 15% reduction of resisting DL to account for vertical seismic effects per U.B.C. §1633.1.

?

LANE ENGINEERS, INC.

Post Office Box 1059 • Tulare, California 93275 • (209) 688-5263
FAX - (209) 688-8893

PROJECT	1997 U.B.C. LATERAL RESTRAINT SYSTEM	SHEET	1-3	OF	4
CLIENT	POLY PROCESSING COMPANY	JOB NO.	98098		
BY	DKA	CHKD BY	DKA		DATE
			August 1, 1998		

3. Shear Loading to Base Clips:

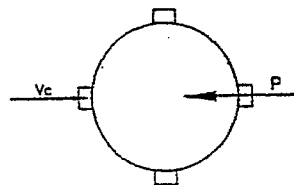
a) Net lateral force resisted by base clips = P:

For seismic loading, the net seismic force to the base clips = Total seismic - Frictional resistance.

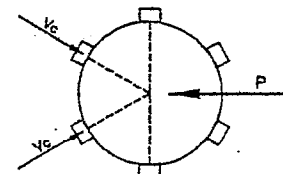
$$\therefore P = V_b - \mu(k) * W \quad [\mu(k) = \text{"kinetic friction factor", determined by laboratory testing}]$$

b) For 4 - clip system:

$$V_c = P$$



4 Base Clip System



6 Base Clip System

c) For 6 - clip system:

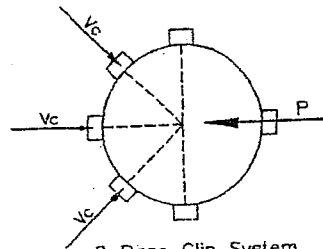
$$P = 2 * V_c * \sin(60^\circ) = 1.7321 * V_c$$

$$\rightarrow V_c = 0.57735 * P$$

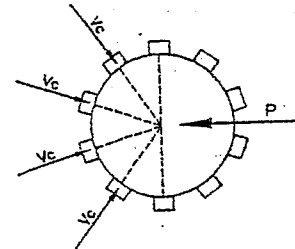
d) For 8 - clip system:

$$P = V_c + [2 * V_c * \sin(45^\circ)] = (1 + 1.4142) * V_c$$

$$\rightarrow V_c = 0.4142 * P$$



8 Base Clip System



10 Base Clip System

e) For 10 - clip system:

$$P = 2 * V_c * \sin(36^\circ) + 2 * V_c * \sin(72^\circ)$$

$$= (1.1756 + 1.9021) * V_c$$

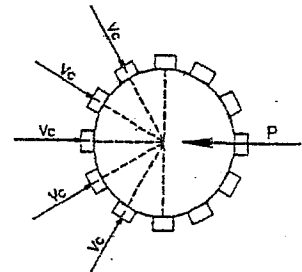
$$\rightarrow V_c = 0.3249 * P$$

f) For 12 - clip system:

$$P = V_c + [2 * V_c * \sin(30^\circ)] + [2 * V_c * \sin(60^\circ)]$$

$$= (1 + 1 + 1.732) * V_c = 3.732 * V_c$$

$$\rightarrow V_c = 0.2679 * P$$



12 Base Clip System

4. Example: Load Calculation for PPC Model No. SP707-U (Closed-top):

a) Capacity = 16,400 lbs

D = 14'-0"

H = 16'-0"

Empty Weight = 4,200 lbs

Weight of Contents:

$$W_c = S.G. * Cap. * \rho g(wtr) * (1cf / 7.48 gal.)$$

$$W_c = \frac{1.90 * 16,400 gal * 62.4pcf}{7.48 gal/cf} = 259,944 lbs$$

b) Seismic Loading & Reactions (Zone 4, within 2 kilometers of "Seismic Source B" fault):

Total Weight = W = 259,944 + 4,200 = 264,144 lbs

Period of Tank [U.B.C. Method A] = $0.02 * (16')^{3/4} = 0.16$ seconds.

Period of First Sloshing Mode [A.P.I. 650] = $0.58 * (14')^{1/2} = 2.171$ seconds.

Base shear equations:

$$\textcircled{1} V_b \text{ [U.B.C.]} = (C_v * I * W) / R * T = (0.64 * 1.6 * 1.25) / (2.9 * 0.16) * W = 2.759 * W$$

LANE ENGINEERS, INC.

Post Office Box 1059 • Tulare, California 93275 • (209) 688-5263
FAX - (209) 688-8893

PROJECT	1997 U.B.C. LATERAL RESTRAINT SYSTEM	SHEET	14	OF	4
CLIENT	POLY PROCESSING COMPANY	JOB NO.	98098		
BY	DKA	CHKD BY	DKA	DATE	August 1, 1998

- ① $V_b [A.P.I.] = (0.64 * 1.6 * 1.25) / (2.9 * 2.171) * W = 0.2033 * W$
- ② $V_b = (2.5 * C_a * I * W) / R = 0.5216 * W$ ("Need not exceed...")
- ③ $V_b = 0.56 * C_a * I * W = 0.3388 * W$ ("Minimum...")
- ④ $V_b = (1.6 * Z * N_v * I * W) / R = 0.4414 * W$ ("Minimum for Zone 4...") → Governs all load cases.

Seismic force per allowable stress design = $(0.4414 / 1.4) * W = 0.3153 * 264,144 \text{ lbs} = 83,273 \text{ lbs}$

Overturning Moment = $83,273 \text{ lbs} * (16' / 2) = 666,184 \text{ ft-lbs}$

Resisting Moment = $264,144 \text{ lbs} * (14' / 2) * 0.85 = 1,571,657 \text{ ft-lbs}$ → Tank is stable against overturning.

For a kinetic friction factor of 0.27 (polyethylene to concrete, flat surface, 8 - clips):

$$V_c = 0.4142 * [83,273 \text{ lbs} - 0.27 * 264,144 \text{ lbs}] = 4,952 \text{ lbs}$$

For anchor bolt analysis, refer to base clip calculations.

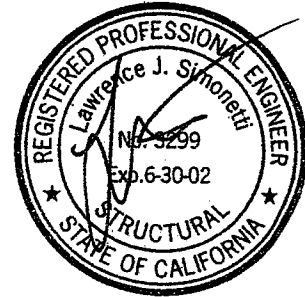
Calculation Package "AC11"
for
AC-11 Base Clips

Manufacturer:

Poly Processing Company
8055 South Ash Street
French Camp, CA 95231
PH: (209) 982-4904

Engineer:

Lane Engineers, Inc.
979 North Blackstone Ave
Tulare, CA 93277
PH: (559) 688-5263



Design Criteria, Unless Noted Otherwise:

Uniform Building Code (Published by I.C.B.O.).....	1997 Edition
Wind Loading.....	100 MPH Basic, Exposure D
Seismic Loading.....	Zone 4, Source B, w/in 2 Km (See Note No. 3 below)
Carbon Structural Steel.....	ASTM A36
Stainless Structural Steel.....	ASTM A276, Type 304

NOTES:

1. The purchaser shall be responsible for verifying local building code requirements and/or project specifications. Additional engineering assistance may be required to comply with local codes or individual project specifications.
2. Design of the tank foundation is beyond the scope of these calculations.
3. The *calculation data sheet* attached herewith reflects the design loading on the tank when it is located in Seismic Zone 4 within 2 kilometers of a fault classified as "Seismic Source B". *Special engineering assistance is required if the tank is located in Seismic Zone 4 within 5 kilometers of a fault classified as "Seismic Source A"*. Location and layout of actively-known faults in the State of California is shown in the I.C.B.O. publication "Maps of Known Active Fault Near-Source Zones in California & Adjacent Portions of Nevada".

LANE ENGINEERS, INC.

Post Office Box 1059 • Tulare, California 93275 • (209) 688-5263
FAX - (209) 688-8893

PROJECT	1997 U.B.C. LATERAL RESTRAINT SYSTEM	SHEET	11-2	OF	4
CLIENT	POLY PROCESSING COMPANY	JOB NO.	98098		
BY	DKA	CHKD BY	DKA		
		DATE	August 1, 1998		

1997 U.B.C. --- PACKAGE AC11: BASE CLIP "AC-11" CAPACITY

1. Parameters:

- a) For outdoor installations, the base clips resist loads imposed by wind or seismic forces.
- b) Cables will be attached to the base clips to resist tank overturning due to *wind loading*.
- c) The combination of applicable forces will be transferred to the anchor bolts (2 at each base clip) by a combination of the sliding and overturning action of the base clips.

2. Base Clip AC-11 (L4x3x5/16 x 8" long):

Vertical leg = 3"

Horizontal leg = 4"

Length = 8"

Lateral load is applied at 1½" up from the concrete surface (dimension "h").

Anchor bolts are located at 2" from the vertical face (dimension a = 2").

Assume 3,300 lbs lateral load:

∴ $V_c = 3,300$ lbs

$$M_c = \frac{V_c * (h - t)}{L} = \frac{3,300 * (1.5 - 0.3125)}{8} = 490 \text{ in-lbs/in}$$

$$t \text{ (req'd)} = \sqrt{\frac{6 * M_c}{0.75 * F_y * 1.33}} = \sqrt{\frac{6 * 490}{0.75 * 30,000 * 1.33}} = 0.3130" \approx 0.3125", \text{ o.k.}$$

Therefore, L4x3x5/16 x 8" long can resist a 3,300 lb. lateral load.

3. Anchor Bolt Forces:

REF: "Design in Structural Steel"; Lothers, 3rd Edition.

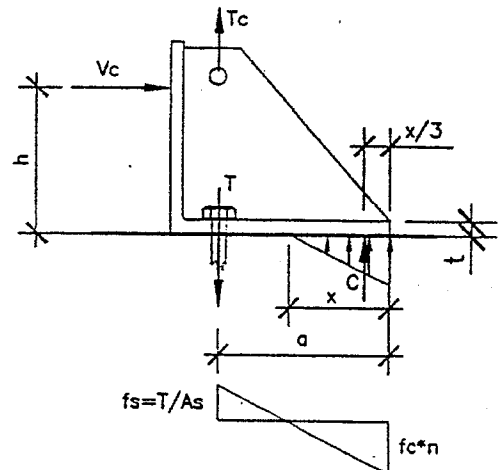
$$n = E_s / E_c = \frac{29 * 10^6}{57 * 10^3 * \sqrt{2500}} = 10.175$$

For AC-11 & 2 - 'HILTI' 5/8" dia. anchors:

$$A_s = 2 * 0.3068 = 0.6136 \text{ in}^2 \text{ (2 anchors at each base clip)}$$

$$B = 8"$$

$$Bx^2 + (2 * n * A_s)x - (2 * n * A_s * a) = 0$$



LANE ENGINEERS, INC.

Post Office Box 1059 • Tulare, California 93275 • (209) 688-5263
FAX - (209) 688-8893

PROJECT	1997 U.B.C. LATERAL RESTRAINT SYSTEM	SHEET	11-3	OF	4
CLIENT	POLY PROCESSING COMPANY	JOB NO.	98098		
BY	DKA	CHKD BY	DKA	DATE	August 1, 1998

$$8x^2 + (2*10.18*0.6136)x - (2*10.18*0.6136*2) = 0$$
$$-x = 1.151''$$

$$T \text{ (total)} = \frac{V_c * h}{a - \frac{x}{3}} + T_c = \frac{V_c * 1.50}{2.0 - \frac{1.151}{3}} + T_c = 0.9280 * V_c + T_c$$

$$\text{Anchor bolt tension} = T_b = T/2 = 0.4640 * V_c + T_c/2$$

$$\text{Maximum concrete bearing stress} = C = (f_c * B * x)/2 = T - T_c$$

$$f_c = \frac{2 * 1.4 * (T - T_c)}{B * x} = 0.3041 * (T - T_c)$$

$$\text{Maximum shear per bolt} = V_b = V_c/2$$

4. Allowable Anchor Bolt Forces:

Anchor Type 1: 'HILTI' Kwik Bolt II Expansion Anchor w/ 4" Embedment

Allowable Forces per I.C.B.O. Report No. 4627 (stainless steel, without spec. insp.):

Spacing required for maximum load = 8" [Mult. Factor = 1.0]

Spacing required for minimum load = 4" [Mult. Factor = 0.70 for tension and shear]

For 5" anchor bolt spacing, mult. factor = 0.775.

Try $V_c = 2,000 \text{ lbs}$ & $T_c = 0$ (Actual data sheets compare wind & seismic w/ allowables):

$$T_b = 0.464 * 2,000 \text{ lbs} = 928 \text{ lbs}$$

$$V_b = 2,000 \text{ lbs}/2 = 1,000 \text{ lbs}$$

$$T \text{ (allow)} = 988 \text{ lbs} * 1.33 * 0.775 = 1,020 \text{ lbs.}$$

$$V \text{ (allow)} = 3,125 \text{ lbs} * 1.33 * 0.775 = 3,229 \text{ lbs.}$$

$$\text{Combined Stress Ratio} = \left(\frac{928 \text{ lbs}}{1,020 \text{ lbs}} \right)^{5/3} + \left(\frac{1,000 \text{ lbs}}{3,229 \text{ lbs}} \right)^{5/3} = 1.00, \text{ o.k. [Equ'n per ICBO report, Paragraph 2.5.2]}$$

Anchor Type 2: 'HILTI' HVA Chemical Anchor w/ HVU Resin

For $V_c = 3,300 \text{ lbs}$ & $T_c = 0$ (Actual data sheets compare wind & seismic w/ allowables):

$$T_b = 0.464 * 3,300 = 1,532 \text{ lbs.}$$

$$V_b = 3,300 \text{ lbs}/2 = 1,650 \text{ lbs.}$$

Allowable Forces per I.C.B.O. Report No. 5369 (stainless steel, with spec. insp.):

Spacing required for maximum load = $2 * 5" = 10"$ [Factor = 1.0]

Spacing required for minimum load = $0.50 * 5" = 2\frac{1}{2}"$ [Factor = 0.70 for tension and shear]

For 5" anchor bolt spacing, multiplication factor = 0.80.

For a temperature of 105°F, multiplication factor = 0.86 [Figure 2]

LANE ENGINEERS, INC.

Post Office Box 1059 • Tulare, California 93275 • (209) 688-5263
FAX - (209) 688-8893

PROJECT	1997 U.B.C. LATERAL RESTRAINT SYSTEM	SHEET	11-4	OF	4
CLIENT	POLY PROCESSING COMPANY	JOB NO.	98098		
BY	DKA	CHKD BY	DKA	DATE	August 1, 1998

$$T (\text{allow}) = 4,289 \text{ lbs} * 1.33 * 0.80 * 0.86 = 3,934 \text{ lbs.}$$

$$V (\text{allow}) = 3,025 \text{ lbs} * 1.33 * 0.80 * 0.86 = 2,775 \text{ lbs.}$$

$$\text{Combined Stress Ratio} = \frac{1,532 \text{ lbs}}{3,934 \text{ lbs}} + \frac{1,650 \text{ lbs}}{2,775 \text{ lbs}} = 0.984, \text{ o.k.}$$

5. Verify Concrete Bearing:

$$F'_c = 0.70 * 0.85 * 2,500 \text{ psi} = 1,488 \text{ psi [U.B.C. Section 1910.17.1]}$$

$$f_c = \frac{2 * 1.4 * 3,064 \text{ lbs}}{8 * 1.151} = 721 \text{ psi} < F'_c, \text{ o.k.}$$

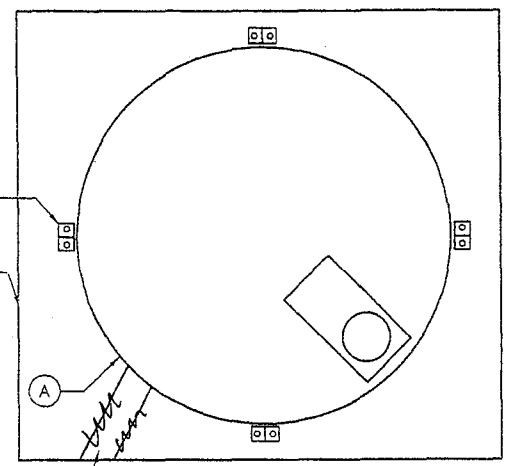
AC-11 BASE CLIP: L4x3x5/16 x 8" long, LLH. Stainless or carbon steel.

ANCHOR BOLTS:

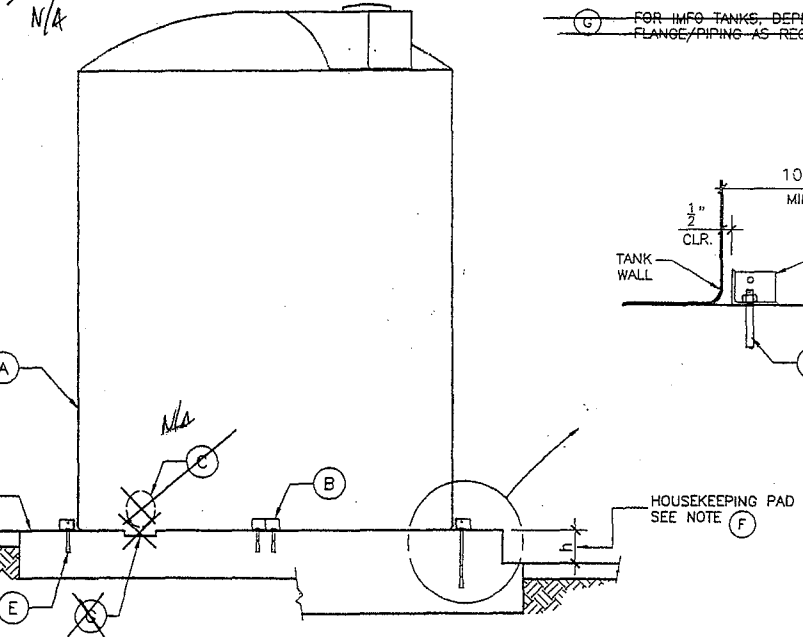
2,000 lb. Capacity: 2 - 5/8" dia. 'HILTI' Kwik Bolt II expansion anchors (std or stainless) with 4" embedment into concrete. Install per I.C.B.O. Report No. 4627. Special inspection is not required.

3,300 lb. Capacity: 2 - 5/8" dia. 'HILTI' HVA chemical anchors with HAS rods (std or stainless) and HVU resin with 5" embedment into concrete. Install per I.C.B.O. Report No. 5369. Special inspection is required.

P13.1.dwg 10-27-88 12:03:44 pm EST



PLAN VIEW



ELEVATION VIEW
NO SCALE

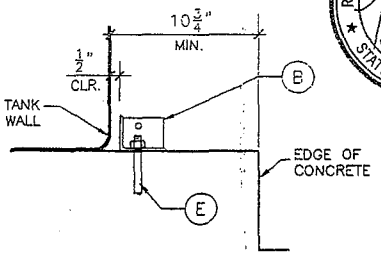
KEY NOTES

- (A) POLYETHYLENE TANK
- (B) AC-11 BASE CLIP (4-TOTAL); $L4 \times 3 \times \frac{5}{16}$ " x 0'-8" (LLH) EQUALLY SPACED
- (C) OPENING FOR IMFO TANKS N/A
- (D) CONCRETE SLAB/FOOTING & REINFORCEMENT DESIGNED BY OTHERS.
- (E) $\frac{5}{8}$ " Ø 'HILT' KWIK BOLT II EXPANSION TYPE ASTM A510 ANCHOR WITH 4" MINIMUM EMBEDMENT INTO CONCRETE. ASTM A276, TYPE 304 OR 316 STAINLESS STEEL MAY BE SUBSTITUTED FOR ASTM A510. INSTALL PER I.C.B.O. REPORT No. 4627. SPECIAL INSPECTION IS NOT REQUIRED. (5-TOTAL)

ANCHOR BOLTS SUPPLIED BY OTHERS

- (F) HOUSEKEEPING PAD IS DESIGNED BY OTHERS. ANCHORAGE OF BASE CLIPS SHALL BE AS FOLLOWS:
 CASE A: PAD PLACED MONOLITHICALLY WITH FOOTING. ANCHOR LENGTH SHALL BE AS SPECIFIED IN KEY NOTE (E)
 CASE B: PAD PLACED SEPARATE FROM FOOTING (i.e. COLD JOINT BETWEEN PAD & FOOTING). ANCHOR LENGTH SPECIFIED IN KEYNOTE (E) SHALL BE INCREASED BY 'h'.

(G) FOR IMFO TANKS, DEPRESS CONCRETE SLAB/FOOTING AT IMFO FLANGE/PIPING AS REQUIRED. (DESIGNED BY OTHERS) N/A



GENERAL NOTES

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE WORK OF ALL TRADES AND SHALL VERIFY ALL DIMENSIONS, CONDITIONS, AND UTILITY LOCATIONS PRIOR TO STARTING WORK.
2. NOTES AND DETAILS ON THESE DRAWINGS SHALL TAKE PRECEDENCE OVER THESE GENERAL NOTES.
3. THE CONTRACTOR SHALL USE ADEQUATE NUMBERS OF SKILLED WORKMEN WHO ARE COMPLETELY FAMILIAR WITH THE SPECIFIED REQUIREMENTS AND METHODS NEEDED FOR PROPER PERFORMANCE OF THE WORK.
4. CONCRETE SHALL HAVE A 28 DAY COMPRESSIVE STRENGTH (F'c) OF 2500 PSI MINIMUM.
5. DESIGN CRITERIA:
 GOVERNING CODE: UNIFORM BUILDING CODE, 1997 EDITION.
 SEISMIC: ZONE 4 W/IN 2 KM OF "SOURCE B" FAULT, IM1, 25.
 WIND: N.A. - INDOOR INSTALLATION
 SPECIFIC GRAVITY OF CONTENTS=1.9
6. THE PURCHASER SHALL BE RESPONSIBLE FOR VERIFYING LOCAL BUILDING CODE REQUIREMENTS AND/OR PROJECT SPECIFICATIONS. ENGINEERING ASSISTANCE MAY BE REQUIRED TO COMPLY WITH LOCAL CODES OR INDIVIDUAL PROJECT SPECIFICATIONS.
7. FOR INDOOR INSTALLATIONS, THE BUILDING SHALL BE FULLY ENCLOSED AND DESIGNED TO RESIST WIND LOADS AS SPECIFIED IN CHAPTER 16, DIVISION III, 1997 UNIFORM BUILDING CODE.

STRUCTURAL STEEL NOTES

1. ALL STRUCTURAL AND MISCELLANEOUS SHAPES AND PLATES SHALL BE FABRICATED IN ACCORDANCE WITH AISC "SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS", LATEST EDITION. CARBON STEEL SHAPES & PLATES SHALL CONFORM TO ASTM A36 OR A572 (36 KSI MINIMUM YIELD STRENGTH).
2. ALL WELDING SHALL BE DONE BY QUALIFIED WELDERS USING A PRE-APPROVED PROCESS. ALL WELDS SHALL BE UNIFORM IN SIZE AND APPEARANCE AND FREE OF PINHOLES, POROSITY, UNDERCUTTING OR OTHER DEFECTS.
3. ALL WELDING SHALL CONFORM TO AWS D1.1-98 OF THE STRUCTURAL WELDING CODE. JOINT DETAILS SHALL COMPLY WITH AWS REQUIREMENTS FOR JOINTS ACCEPTED WITHOUT QUALIFICATION TESTS.
4. WELD METAL SHALL HAVE A NOMINAL TENSILE STRENGTH OF 70,000 PSI MINIMUM.
5. UNLESS NOTED OTHERWISE, STANDARD FINISH OF ALL RESTRAINT SYSTEM HARDWARE IS HOT-DIPPED GALVANIZED IN ACCORDANCE WITH ASTM A153. OTHER FINISHES AVAILABLE UPON REQUEST.
6. STAINLESS STEEL SHAPES CONFORMING TO ASTM A276, TYPE 304 OR 316 (30 KSI MINIMUM YIELD STRENGTH) MAY BE SUBSTITUTED FOR CARBON STEEL SHAPES.
7. STAINLESS STEEL PLATES CONFORMING TO ASTM A167, TYPE 304 OR 316 (30 KSI MINIMUM YIELD STRENGTH) MAY BE SUBSTITUTED FOR CARBON STEEL PLATES.

ANCHOR BOLTS

1. ANCHOR BOLTS SHALL BE FURNISHED AND INSTALLED AS SPECIFIED ON THIS DRAWING. ANCHOR BOLTS ARE NOT FURNISHED BY POLY PROCESSING COMPANY.
2. THE MINIMUM DISTANCE SHOWN FROM THE EDGE OF THE CONCRETE TO THE FACE OF THE TANK IS BASED ON INFORMATION FROM THE I.C.B.O. REPORT REFERENCED ON THIS DRAWING. IF THE ACTUAL DISTANCE IS LESS THAN THAT SHOWN, SPECIAL ENGINEERING ASSISTANCE IS REQUIRED.

SEISMIC DESIGN NOTE: IF TANK IS LOCATED W/IN 5 KM. OF A "SOURCE A" FAULT, SPECIAL ENGINEERING ASSISTANCE IS REQUIRED. REFER TO I.C.B.O. PUBLICATION "MAPS OF KNOWN ACTIVE FAULT NEAR-SOURCE ZONES"

CONFIDENTIAL PROPERTY OF
POLY PROCESSING CO.

NOT FOR REPRINT OR USE WITHOUT
PERMISSION OF POLY PROCESSING CO.

LANE ENGINEERS INC.
CIVIL • STRUCTURAL • SURVEYING
979 N. Blackstone Street
Tulare, California 93274...
(559) 688-5283

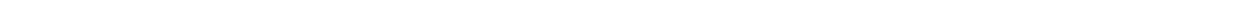
REVISIONS

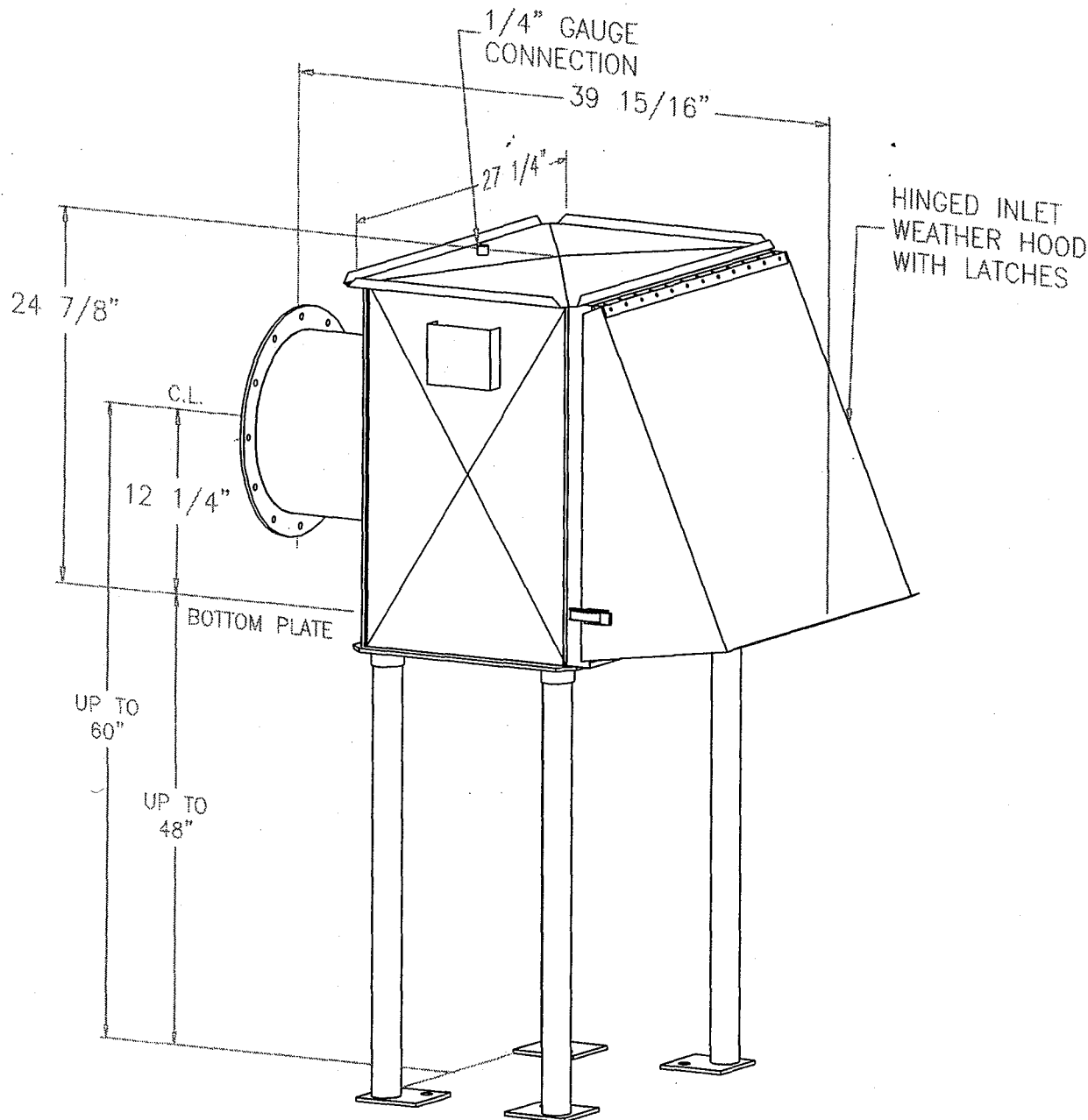
MANUFACTURER:
POLY PROCESSING CO.
WESTERN REGION
8055 South Ash Street
Fresno, Camp, CA 95231
PH: (209) 982-4904

UPRIGHT TANK
**CLOSED TOP
INDOOR**

NAME	T.C.
DATE	9-1-98
SCALE	NOTED
CHECKED	D.K.A.
DRAWING NO.	P13.1
JOB NO.	98098

Vapor Phase Assembly





NOTES:

- 1) STAINLESS STEEL CONSTRUCTION
- 2) STANDARD CONSTRUCTION INCLUDES HINGED WEATHER HOODS, 1/4" GAUGE CONNECTION, SILENCING/PROTECTION CORE, AND REMOVABLE LEGS
- 3) CONNECTION IS 12" FLAT FACE PLATE FLANGE WITH BOLT HOLES MATCHING ANSI 150# PATTERN
- 4) ELEMENT NO. SPP076 (1 REQUIRED) WITH 32.5 SQUARE FEET OF MEDIA PER ELEMENT
- 5) SPP076 MEDIA IS MULTI-LAYERED WIRE MESH PROVIDING 100 MICRON RETENTION AT 95% EFFICIENCY
- 6) HOUSING INCLUDES SUPPORT LEGS WITH OVERALL HEIGHT UP TO 48"

APPROVED BY: _____
 PROCEED WITH FABRICATION
 DATE: _____

UNAUTHORIZED USE, MANUFACTURE OR REPRODUCTION IN WHOLE OR IN PART IS PROHIBITED. DRAWING DESIGNS AND OTHER DISCLOSURES ARE PROPERTY OF IFM, INC.

**IFM Industrial Filter
 Manufacturers**

10244 HEDDEN ROAD • EVANSVILLE, INDIANA 47711 • (812) 867-4730

TOLERANCE UNLESS NOTED	SHEET: 1 OF 1
FRACTIONS: ±1/4"	DRAWN BY: SLJ
DECIMALS: ±0.01"	DATE: 3/9/06
ANGLES: ±2°	SCALE: NTS

HOUSING NO. AFP121-1SMSS
 ELEMENT NO. SPP076 (1 REQUIRED)

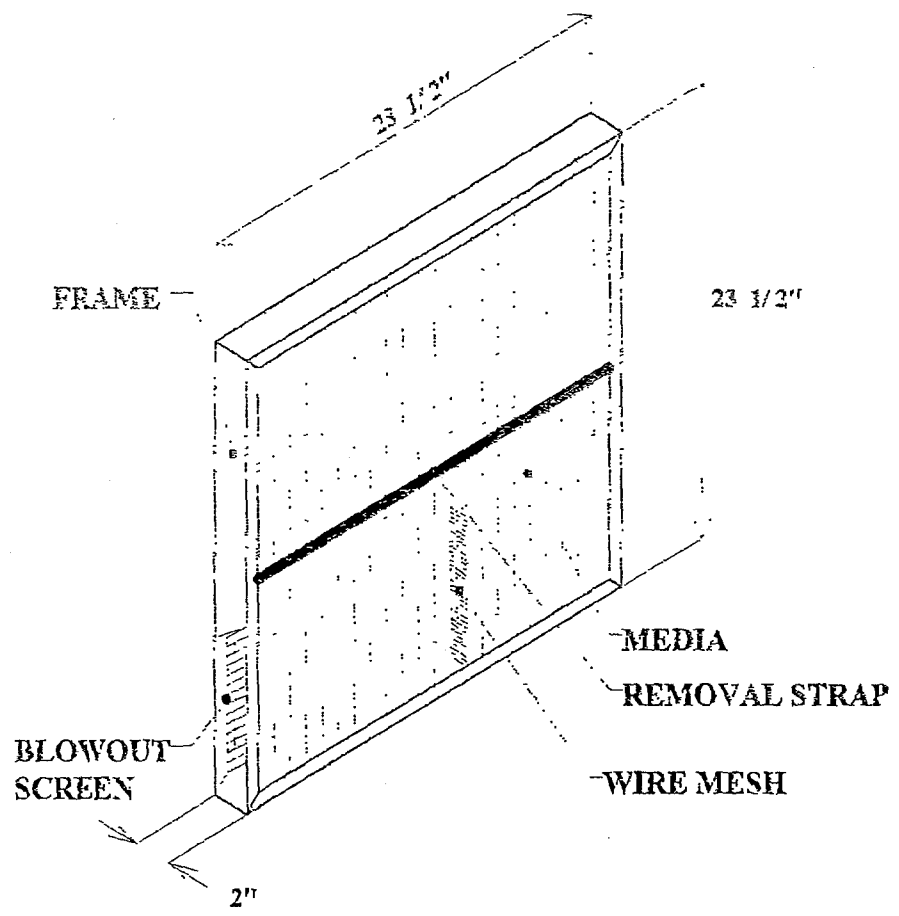
ONE STAGE AIR INTAKE FILTER/SILENCER	APPR. BY: IFM DWG. NO: AFP121-1SMSS-C
---	--

MATERIAL SPECIFICATIONS:

- 1) FRAME TO BE 22 GA. 304 STAINLESS STEEL
- 2) MEDIA TO BE 18 MESH STAINLESS STEEL
- 3) BACKUP WIRE TO BE 18 MESH STAINLESS STEEL
- 4) BLOW-OUT SCREEN TO BE 4 X 4 MESH STAINLESS STEEL

DESIGN SPECIFICATIONS:

- A) ELEMENT TO BE PANEL TYPE 24" x 24" x 2" NOMINAL
- B) ELEMENT TOTAL SQUARE FEET TO BE (32.5)
- C) EFFICIENCY TO BE 95% OF 100 MICRONS



10744 HEDDEN ROAD, EVANSVILLE, INDIANA 47711 (812) 867-4730

UNAUTHORIZED USE, MANUFACTURE, OR REPRODUCTION IN WHOLE OR IN PART IS PROHIBITED. DRAWING DESIGNS AND OTHER DISCLOSURES ARE PROPERTY OF IFM, INC.

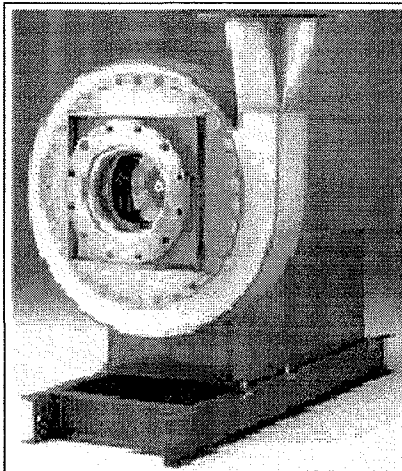
PANEL ELEMENT NUMBER: SPP076SS

APPROVED BY: _____

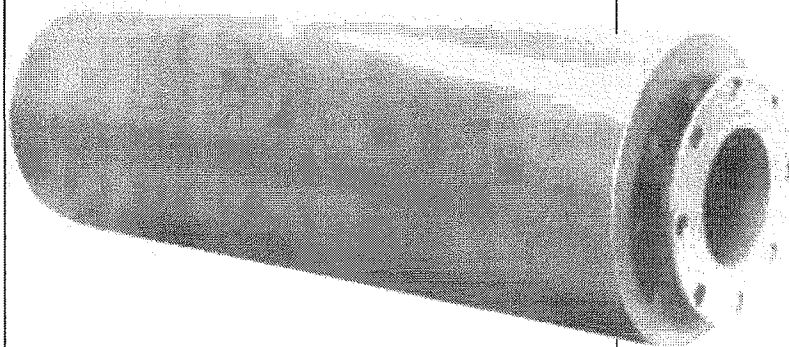
PROCEED WITH FABRICATION

DATE: _____

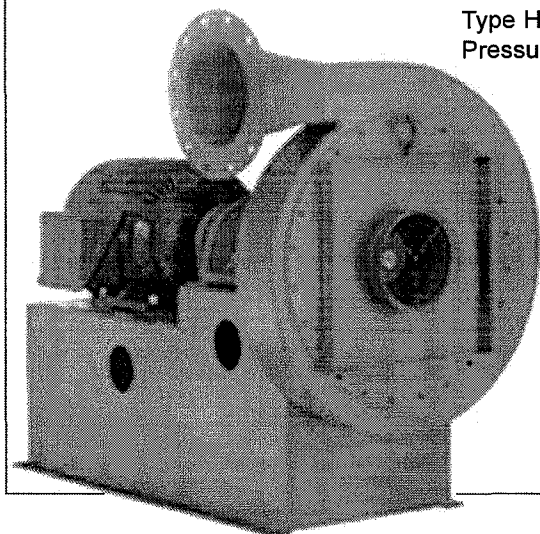
PRESSURE BLOWER AND TYPE HP PRESSURE BLOWER SILENCERS



Pressure Blower



Type HP
Pressure Blower



The New York Blower Company offers a wide variety of silencer solutions for its fans and blowers.

The silencers shown in this supplement have been designed specifically for **nyb's** Pressure Blower and Type HP Pressure Blower products. They have been rated for acoustical attenuation with air flowing through them. The term "Dynamic Insertion Loss" is used to express attenuation when silencers are rated by this method, which has come to be recognized as the most accurate method for rating equipment that must handle air as well as attenuate sound.

The "Effective Flow Resistance" of a Pressure Blower Silencer is the result of the aerodynamic design of the silencer. The "Effective Flow Resistance" shown in Chart I provides a means of correcting for this resistance. However, note that in terms of fan static pressure, this correction becomes insignificant for most applications.

FEATURES

Versatile Design - While **nyb** Pressure Blower/Type HP Pressure Blower Silencers were designed specifically for mounting on the inlet or outlet of the fan, they may also be used elsewhere in the duct.

Ease of Installation - Silencers can be equipped with flanged or slip type connections to fit a variety of mounting arrangements. A venturi inlet with guard is also available for use on the inlet side of the silencer when no duct will be used.

Quality Construction - Heavy welded steel construction ... casing filled with high density acoustical absorption material.

Temperature Capability - Silencers operate efficiently at temperatures up to 600°F.

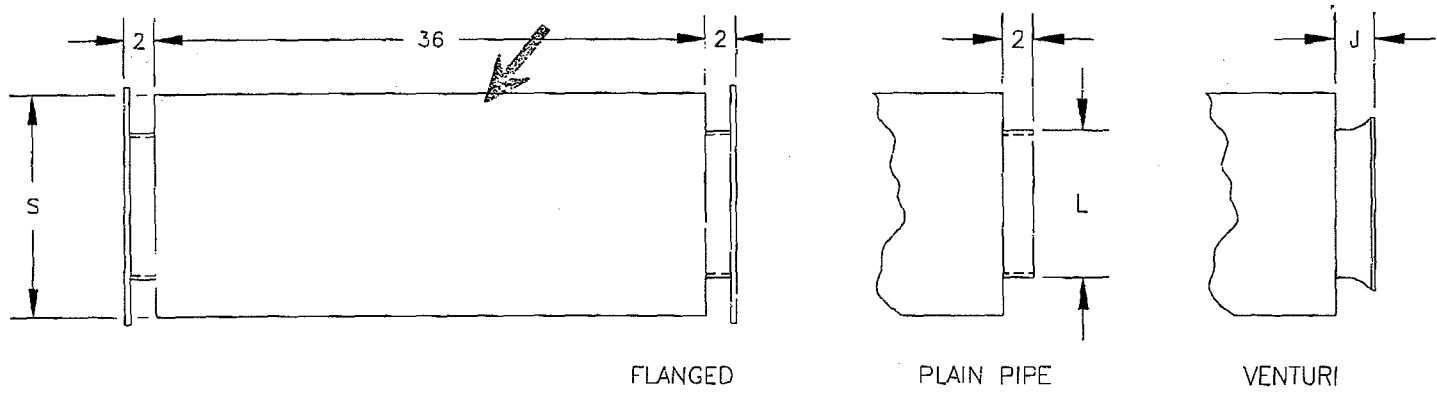
Accurately Rated - The ratings in this supplement provide accurate values of sound power attenuation which can be used to calculate the sound power levels of the fan and silencer combination. All data is based on tests conducted in New York Blower's AMCA Certified laboratory using AMCA prescribed test methods.

nyb | The
New York Blower
Company®



7660 QUINCY STREET—WILLOWBROOK, ILLINOIS 60527-5530
TEL: [630]794-5700•FAX:[630]794-5776•WEB: <http://www.nyb.com>•E-MAIL: nyb@nyb.com

CS-853
2002



- MOUNTING CCDE
- A-FLANGES-BOTH ENDS.
 - ~~B-PLAIN PIPE BOTH ENDS.~~
 - ~~C-ONE END FLANGED & ONE END PLAIN PIPE.~~
 - ~~D-ONE END FLANGED & ONE VENTURI END.~~
 - ~~E-ONE END PLAIN PIPE & ONE VENTURI END.~~

⊕ NOT AVAILABLE ON SIZE 4.

FAN SILENCERS ARE OF HEAVY WELDED STEEL CONSTRUCTION FILLED WITH HIGH DENSITY ACOUSTICAL ABSORPTION MATERIAL.

MAXIMUM TEMPERATURE: 800°F

TOLERANCE: ±1/8

SIZE	J	L (O.D.)	S (DIA.)	FLANGE DIMENSION					
				I.D.		O.D.	BOLT CIRCLE	HOLES	
				NO.	DIA.			NO.	DIA.
4	—	4 1/2	14	4	9	7 1/2	8	3/4	
6	2 5/8	6 5/8	14	6	11	8 1/2	8	7/8	
8	2 5/8	8 5/8	14	8	13 1/2	11 3/4	8	7/8	
10	2 5/8	10 3/4	20	10	16	14 1/4	12	1	
12	3 5/8	12 3/4	20	12	19	17	12	1	

DIMENSIONS SHOULD NOT BE USED FOR CONSTRUCTION PURPOSES UNLESS CERTIFIED.

DATE _____ CERTIFIED _____ CONTROL NO. _____
 CUSTOMER'S NO. _____
 TAG _____

SIZE	QTY.	MTG. CODE
8	1	

CERTIFIED FORM NO
 DRAWING | H-4J

nyb The New York Blow Company
 7660 Quincy Street
 Willowbrook, IL. 60521

FAN SILENCER
 FOR
 PRESSURE BLOWER

DRAWING NUMBER
 FILE _____ DWG. _____

**Short Form for
Sound Calculations**

Customer:	Ref. No.
Fan Size & Type 22081A	CFM 1500 SP 39.5
O.V. 4298 V.P. 1.15 VP/SP 0.027	By: FRN Date: 1/1/02

NOTE

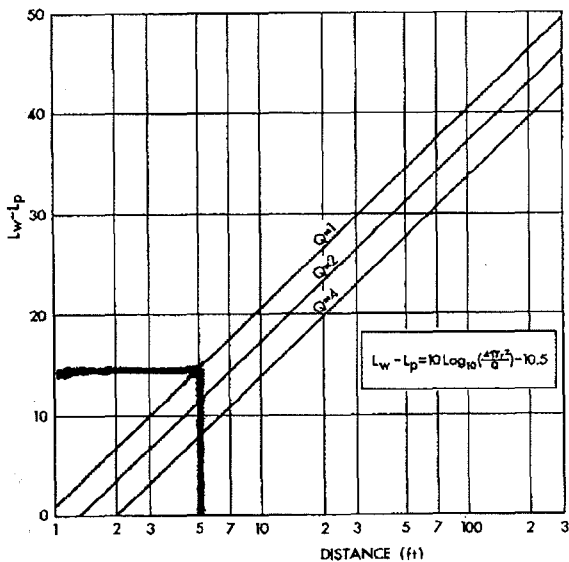
This form is to be used for the approximate sound pressure level calculation of a fan, assuming that the listener's position is in the dominant free field. In most cases this can be considered no more than 5 feet in an enclosed room, or an outside installation free from reflecting surfaces.

OCTAVE BANDS	1	2	3	4	5	6	7	8
CENTER FREQUENCIES	63	125	250	500	1000	2000	4000	8000
1. Fan Sound Power Rating @ 3500 RPM								
2. VP/SP Correction								
3. Fan Sound Power (1) + (2)								
4. Correction for Installation (Inlet, Outlet)	86	92	79	93	91	88	86	84
5. Corrected Sound Power at Fan (3) + (4)								
6. End Reflection Value (Chart III) Silence	-1	-11	-21	-30	-31	-29	-26	-25
7. Corrected Sound Power (5) - (6)	85	81	72	63	60	59	60	59
8. Conversion to Sound Pressure (Chart I)	-14	-14	-14	-14	-14	-14	-14	-14
9. Sound Pressure @ _____ Ft. (7) - (8)	71	67	58	49	46	45	46	45

The estimated dBA value is **53** @ **0** Ft. (Chart II)

CHART I

DIRECTIVITY/DISTANCE REDUCTION



[Given directivity and distance, Sound Power is converted to Sound Pressure]

- Q-1 UNIFORM SPHERICAL RADIATION with no reflecting surface. Example: Stack discharge.
- Q-2 UNIFORM HEMISPHERICAL RADIATION with one reflecting surface. Example: Fan mounted on floor.
- Q-4 UNIFORM RADIATION over 1/4 SPHERE with two reflecting surfaces. Example: Fan mounted on floor near interior wall.

CHART II

SOUND PRESSURE TO DBA CONVERSION

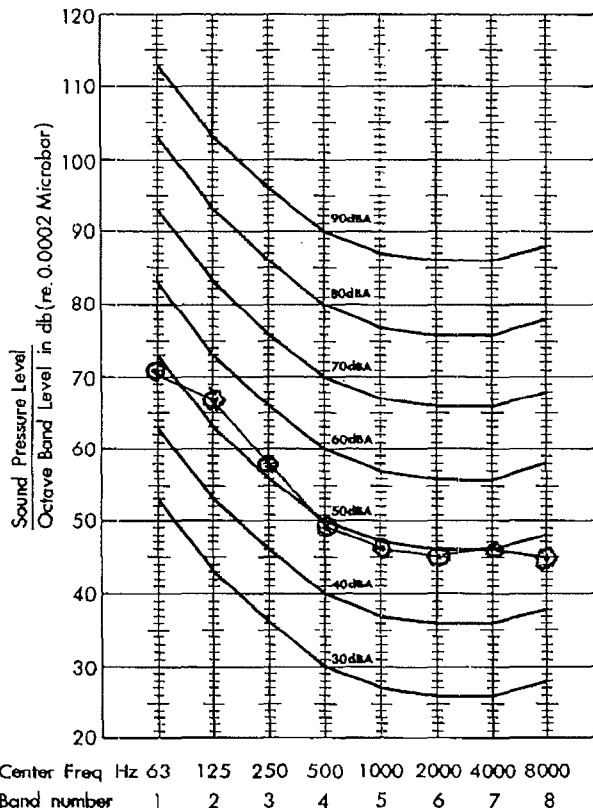
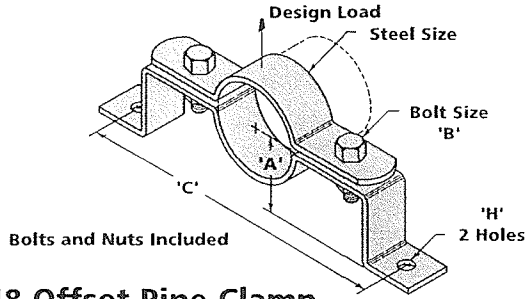


Chart III End Reflection Values (Decibels)

Octave Band	1	2	3	4	5	6	7	8
Hz	63	125	250	500	1000	2000	4000	8000
Duct Diameter (Inches)								
5	23.5	17.5	12	7.0	2.5	.5	—	—
10	17.5	12.0	7.0	3.0	1.0	—	—	—
15	14.5	9.0	4.5	1.5	—	—	—	—
20	12.0	7.0	3.0	1.0	—	—	—	—
30	9.0	4.5	1.5	.5	—	—	—	—
40	6.5	2.5	1.0	—	—	—	—	—

The
New York Blower
Company
7660 QUINCY STREET - WILLOWBROOK, ILLINOIS 60521

Pipe Clamps



Material: Steel (Stainless steel available)

Standard Finish: Plain or Electro-Plated

Service: Designed for supporting vertical or horizontal pipe runs at a fixed distance from a wall or structure.

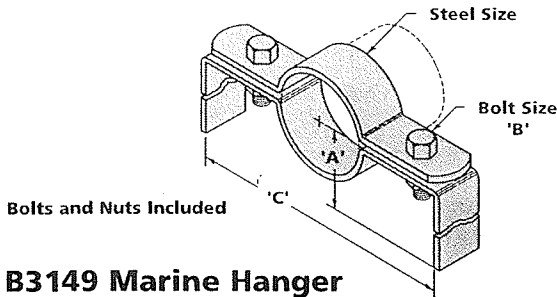
Ordering: Specify part number and finish.

Note: Ductile and cast iron sizes are available.

Figure B3148 Offset Pipe Clamp

Part No.	Nominal Pipe Size		'A'		Bolt Size 'B'		'C'		'H'		Steel Size		Design Load		Wt./C	
				(mm)				(mm)		(mm)			Lbs.	kN	Lbs.	kg
B3148-1/2	1/2"	(15)	2 1/2"	(63.5)	3/8"-16 x 1 1/2"	6"	(152.4)	7/16"	(11.1)	7 Ga. x 1 1/4"	(4.6 x 31.7)	190	(.84)	106	(48.1)	
B3148-3/4	3/4"	(20)	2 1/2"	(63.5)	3/8"-16 x 1 1/2"	7 5/16"	(185.7)	7/16"	(11.1)	7 Ga. x 1 1/4"	(4.6 x 31.7)	190	(.84)	112	(50.8)	
B3148-1	1"	(25)	2 5/8"	(66.7)	3/8"-16 x 1 1/2"	7 9/16"	(192.1)	7/16"	(11.1)	7 Ga. x 1 1/4"	(4.6 x 31.7)	190	(.84)	123	(55.8)	
B3148-1 1/4	1 1/4"	(32)	2 13/16"	(71.4)	3/8"-16 x 1 1/2"	7 7/8"	(200.0)	7/16"	(11.1)	7 Ga. x 1 1/4"	(4.6 x 31.7)	190	(.84)	133	(60.3)	
B3148-1 1/2	1 1/2"	(40)	2 15/16"	(74.6)	3/8"-16 x 1 1/2"	8 1/4"	(209.5)	7/16"	(11.1)	7 Ga. x 1 1/4"	(4.6 x 31.7)	190	(.84)	140	(63.5)	
B3148-2	2"	(50)	3 3/16"	(81.0)	3/8"-16 x 1 3/4"	9 1/8"	(231.8)	7/16"	(11.1)	1/4" x 1 1/4"	(6.3 x 31.7)	420	(1.87)	195	(88.4)	
B3148-2 1/2	2 1/2"	(65)	3 7/16"	(87.3)	3/8"-16 x 1 3/4"	10 1/2"	(266.7)	7/16"	(11.1)	1/4" x 1 1/4"	(6.3 x 31.7)	420	(1.87)	226	(102.5)	
B3148-3	3"	(80)	3 3/4"	(95.2)	3/8"-16 x 1 3/4"	11 1/8"	(282.6)	7/16"	(11.1)	1/4" x 1 1/4"	(6.3 x 31.7)	420	(1.87)	244	(110.7)	
B3148-4	4"	(100)	4 1/4"	(107.9)	1/2"-13 x 2"	12 1/2"	(317.5)	9/16"	(14.3)	1/4" x 1 1/2"	(6.3 x 38.1)	610	(2.71)	358	(162.4)	
B3148-5	5"	(125)	4 3/4"	(120.6)	1/2"-13 x 2 1/4"	13 3/4"	(349.2)	9/16"	(14.3)	1/4" x 1 1/2"	(6.3 x 38.1)	610	(2.71)	415	(188.2)	
B3148-6	6"	(150)	5 5/16"	(134.9)	1/2"-13 x 2 1/4"	16 1/2"	(419.1)	9/16"	(14.3)	3/8" x 1 1/2"	(9.5 x 38.1)	870	(3.87)	685	(310.7)	
B3148-8	8"	(200)	6 5/16"	(160.3)	1/2"-13 x 2 1/2"	18 5/8"	(473.1)	9/16"	(14.3)	3/8" x 1 1/2"	(9.5 x 38.1)	870	(3.87)	815	(369.7)	
B3148-10	10"	(250)	7 3/4"	(196.8)	3/4"-10 x 3"	23"	(584.2)	1 3/16"	(20.6)	3/8" x 3"	(9.5 x 76.2)	870	(3.87)	2142	(971.6)	
B3148-12	12"	(300)	8 3/4"	(222.2)	3/4"-10 x 3"	25"	(635.0)	1 3/16"	(20.6)	3/8" x 3"	(9.5 x 76.2)	870	(3.87)	2337	(1060.0)	

Pipe Clamps



Material: Steel (Stainless steel available)

Standard Finish: Plain or Electro-Plated

Service: Designed for suspending or supporting pipe runs where exact distance from structure to pipe cannot be determined until installation. Field modify legs to suit conditions.

Ordering: Specify part number and finish.

Figure B3149 Marine Hanger

Part No.	Nominal Pipe Size		'A'		Bolt Size 'B'		'C'		Steel Size		Wt./C	
				(mm)				(mm)			Lbs.	kg
B3149-3/4	3/4"	(20)	12"	(304.8)	3/8"-16 x 1 1/2"	4 7/16"	(112.7)	7 Ga. x 1"	(4.6 x 25.4)	182	(82.5)	
B3149-1	1"	(25)	12"	(304.8)	3/8"-16 x 1 1/2"	4 11/16"	(119.1)	7 Ga. x 1 1/4"	(4.6 x 31.7)	230	(104.3)	
B3149-1 1/4	1 1/4"	(32)	12"	(304.8)	3/8"-16 x 1 1/2"	5"	(127.0)	7 Ga. x 1 1/4"	(4.6 x 31.7)	239	(108.4)	
B3149-1 1/2	1 1/2"	(40)	12"	(304.8)	3/8"-16 x 1 1/2"	5 1/4"	(133.3)	7 Ga. x 1 1/4"	(4.6 x 31.7)	244	(110.7)	
B3149-2	2"	(50)	12"	(304.8)	1/2"-13 x 1 3/4"	6"	(152.4)	7 Ga. x 1 1/2"	(4.6 x 38.1)	319	(144.7)	
B3149-2 1/2	2 1/2"	(65)	12"	(304.8)	1/2"-13 x 2"	7 1/4"	(184.1)	1/4" x 1 1/2"	(6.3 x 38.1)	434	(196.8)	
B3149-3	3"	(80)	12"	(304.8)	1/2"-13 x 2"	7 7/8"	(200.0)	1/4" x 1 1/2"	(6.3 x 38.1)	454	(205.9)	
B3149-4	4"	(100)	12"	(304.8)	1/2"-13 x 2"	9 1/4"	(234.9)	1/4" x 1 1/2"	(6.3 x 38.1)	493	(223.6)	
B3149-5	5"	(125)	12"	(304.8)	1/2"-13 x 2"	10 1/2"	(266.7)	1/4" x 1 1/2"	(6.3 x 38.1)	530	(240.4)	
B3149-6	6"	(150)	12"	(304.8)	5/8"-11 x 2 1/2"	12 1/2"	(317.5)	3/8" x 2"	(9.5 x 50.8)	1142	(518.0)	
B3149-8	8"	(200)	12"	(304.8)	5/8"-11 x 2 1/2"	14 5/8"	(371.5)	3/8" x 2"	(9.5 x 50.8)	1273	(577.4)	

Tapping Screws—Stainless Steel

Stainless self tapping—Type A, AB, B
For metal to metal

• Stainless steel self tapping fasteners are designed for attaching metal to metal and metal to wood.

• Stainless tappers are used in high corrosive environments or where corrossions free performance is required to meet the design life of the project.

Application

→ #14 Type A 304 Stainless
Metal to metal

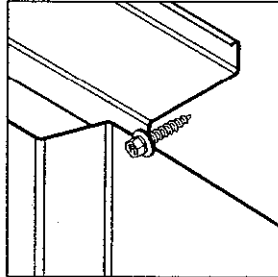
Attachment thickness: .044 – .075

Metal thickness	Drill bit size
.021 – .026	1/8 (.125)
.027 – .050	3/16 (.187)
.051 – .075	#8 (.199)

The hole size determines installation performance and pullout strength.

Thickness is based on normal, single thickness purlin/girt or multiple material thickness combined for total.

Min projection: 3/8" of threads below substrate



3/8" AF 304 Stainless Hex Head
Thread Major Dia: .254 – .248
Thread Minor Dia: .185 – .178

Strength (lbs ult.):
Tensile: 3370
Torsional: 125 in-lbs
Shear: 1520

Pull-out (lbs ult.):
14 ga (.075): 1232
16 ga (.060): 1110

Pull-over (lbs ult.):
22 ga (.030): 1237
24 ga (.024): 790
26 ga (.018): 647

Type AB and B 304
Stainless

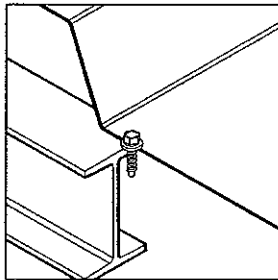
Metal to metal

Attachment thickness: .044 – .500

Metal thickness	Drill bit size
AB .021 – .026	1/8 (.125)
AB .027 – .050	5/32 (.156)
AB .051 – .075	#8 (.199)
AB .075 – .104	#7 (.201)
B .065 – .085	#8 (.199)
B .085 – .115	#7 (.201)
B .115 – .375	#1 (.228)
B .375 – .500	15/64 (.231)

Thickness is based on normal, single thickness purlin/girt or multiple material thickness combined for total.

Min projection: 3/8" of threads below substrate



3/8" AF 304 Stainless Hex Head
Thread Major Dia: .246 – .240
Thread Minor Dia: .192 – .185

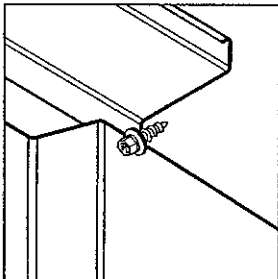
Strength (lbs ult.):
Tensile: 3800
Torsional: 142 in-lbs
Shear: 2350

Pull-out (lbs ult.):
12 ga (.105): 2310
14 ga (.075): 1394
16 ga (.060): 1250

Pull-over (lbs ult.):
22 ga (.030): 1237
24 ga (.024): 790
26 ga (.018): 647

#17 Type AB 304 Stainless
Strip out repair Type A or AB
Metal to metal

Min projection: 3/8" of threads below substrate



3/8" 304 Stainless AF Hex Head
Thread Major Dia: .295 – .285
Thread Minor Dia: .220 – .214

Notes

Dimensions are nominal inches unless noted. Pull-out values (pounds ultimate) are based on 50,000 psi hot rolled steel sheet material. Ultimate values listed are the result of laboratory testing. The specific job conditions should be considered and appropriate safety factors applied when specifying the proper fasteners.

Continued on following page

Self tapping — Type A, AB, B
For metal to metal

Tapping Screws — Stainless Steel

Selection

Length	Part No. #14 A Bond Seal	Part No. 1/4 AB & #17 AB Bond Seal	Part No. 1/4 B Bond Seal
3/4"	E0500-HP	E1240-HP	E0860-HP
1"	E0600-HP	E1300-HP	E0880-HP
1-1/4"	E0640-HP	E1310-HP	—
1-1/2"	E0660-HP	E1320-HP	E1000-HP
2"	E0700-HP	—	E1060-HP
2-1/2"	E0720-HP	—	E1080-HP
3"	E0740-HP	—	E1100-HP
3-1/2"	E0760-HP	—	E1120-HP
4"	E0780-HP	—	E1140-HP
5"	E0820-HP	—	E1180-HP
6"	E0840-HP	—	E1200-HP
7"	E0850-HP	—	E1210-HP
8"	E0855-HP	—	E1215-HP
#17 x 3/4"	—	E1960-KP	—
#17 x 1"	—	E1980-KP	—
#17 x 1-1/2"	—	E2000-KP	—

Installation

Tools: 0 – 600 rpm screwdriver equipped with depth sensing nosepiece.

Options

Painted



Pipe Boot Express

A Division of Protech Products, Inc.

Technical Data

Flasher® Pipe Flashing

Installation Procedure



1. **Cut** to pipe diameter marked on Flashers® (this is approximately 20% smaller than the diameter of the pipe).

2. **Slide** the Flashers® down the pipe, using water to lubricate if necessary.

3. **Form &** bend the aluminum base of the Flashers® to fit the surface of the roof.

4. **Seal** the Flashers® by applying urethane/silicone sealant between the flasher & the roof. Use a large slot screwdriver to press the base down tightly

5. **Fasten** the Flashers® with weather-resistant fasteners to complete the seal.

SIZE CHART

Flasher's® Size	1	2	3	4	5	6	7	8	9
Outside Pipe Diameter (inch)	1/4" to 2"	1 3/4" to 3 1/4"	1/4" to 5"	3" to 6 1/4"	4 1/4" to 7 1/2"	5" to 9"	6" to 11"	7" to 13"	10" to 19"
Base O.D. Diameter	4 3/4"	6 1/4"	7 3/4"	9 1/4"	10 3/4"	12 1/4"	14 1/4"	16 1/2"	25 1/2"
Top Diameter	Closed	1 3/8"	Closed	2 1/4"	3 1/2"	4"	4 1/2"	5 1/2"	7 3/4"
Carton Quantity	10	10	10	5	5	5	5	5	2

MATERIAL SPECIFICATIONS

Test Type	EPDM	Silicone
Advance ozone resistance test @500 pphm	70 Hours	70 Hours
High Temperature: Intermittent- Continuous-	+275 degrees F +212 degrees F	+500 degrees F +437 degrees F
Low Temperature: Resistance tested to- Tensile Strenth-	-65 degrees F 1,450 psi	-100 degrees F 700 psi



511 Central Park Drive, Sanford, Florida 32771-6653
407.328.5300 800.334.9815 407.328.5250 (fax)

