



# Tower and T-Series Dryers Vaporizer

Installation Manual

PNEG-1798

Version: 1.0

Date: 11-11-11

GSI GROUP



PNEG-1798



---

## Contents

<b>Chapter 1 Safety</b> .....	<b>4</b>
Safety Guidelines .....	4
Safety Instructions .....	5
<b>Chapter 2 Decals</b> .....	<b>7</b>
<b>Chapter 3 Purpose</b> .....	<b>9</b>
<b>Chapter 4 Precautions and Limitations</b> .....	<b>10</b>
<b>Chapter 5 References</b> .....	<b>11</b>
<b>Chapter 6 Measuring and Special Equipment Required</b> .....	<b>12</b>
<b>Chapter 7 Procedure</b> .....	<b>13</b>
Dryer Data Information (from its GSI Data Plate) .....	13
Vaporizer Hardware Verification .....	13
Vaporizer Coil and Piping Installation .....	18
Vaporizer High Pressure Leak Testing .....	25
<b>Chapter 8 TD-VIP-01 Data Sheet Selection</b> .....	<b>29</b>
TD-VIP-01 Data Sheet .....	29
<b>Chapter 9 Warranty</b> .....	<b>33</b>

### Safety Guidelines

This manual contains information that is important for you, the owner/operator, to know and understand. This information relates to protecting **personal safety** and **preventing equipment problems**. It is the responsibility of the owner/operator to inform anyone operating or working in the area of this equipment of these safety guidelines. To help you recognize this information, we use the symbols that are defined below. Please read the manual and pay attention to these sections. Failure to read this manual and its safety instructions is a misuse of the equipment and may lead to serious injury or death.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.



**DANGER** indicates a hazardous situation which, if not avoided, will result in death or serious injury.



**WARNING** indicates a hazardous situation which, if not avoided, could result in death or serious injury.



**CAUTION**, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.



**NOTICE** is used to address practices not related to personal injury.

## Safety Instructions

Our foremost concern is your safety and the safety of others associated with this equipment. We want to keep you as a customer. This manual is to help you understand safe operating procedures and some problems that may be encountered by the operator and other personnel.

As owner and/or operator, it is your responsibility to know what requirements, hazards, and precautions exist, and to inform all personnel associated with the equipment or in the area. Safety precautions may be required from the personnel. Avoid any alterations to the equipment. Such alterations may produce a very dangerous situation where **SERIOUS INJURY** or **DEATH** may occur.

This equipment shall be installed in accordance with the current installation codes and applicable regulations, which should be carefully followed in all cases. Authorities having jurisdiction should be consulted before installations are made.

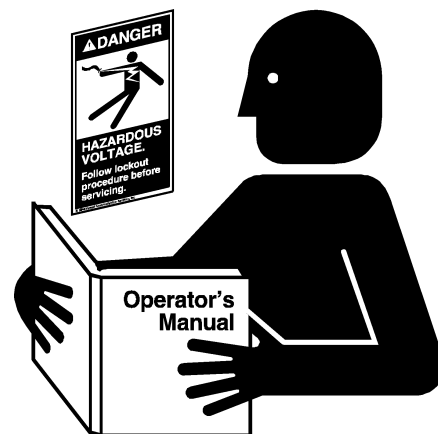
### Follow Safety Instructions

Carefully read all safety messages in this manual and safety signs on your machine. Keep signs in good condition. Replace missing or damaged safety signs. Be sure new equipment components and repair parts include the current safety signs. Replacement safety signs are available from the manufacturer.

Learn how to operate the machine and how to use controls properly. Do not let anyone operate without instruction.

Keep your machinery in proper working condition. Unauthorized modifications to the machine may impair the function and/or safety and affect machine life.

If you do not understand any part of this manual or need assistance, contact your dealer.



**Read and Understand Manual**

### Practice Safe Maintenance

Understand service procedures before doing work. Keep area clean and dry.

Never lubricate, service, or adjust machine while it is in operation. Keep hands, feet, and clothing away from rotating parts.

Keep all parts in good condition and properly installed. Fix damage immediately. Replace worn or broken parts. Remove any built-up grease, oil, and debris.



**Maintain Equipment and Work Area**

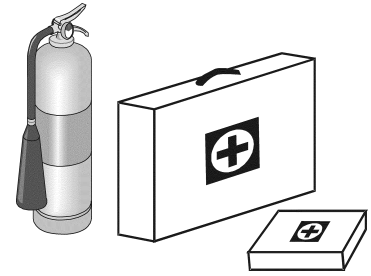
# 1. Safety

## Prepare for Emergencies

Be prepared if fire starts.

Keep a first aid kit and fire extinguisher handy.

Keep emergency numbers for doctors, ambulance service, hospital, and fire department near your telephone.



**Keep Emergency Equipment Quickly Accessible**

## Wear Protective Clothing

Wear close-fitting clothing and safety equipment appropriate to the job.

Remove all jewelry.

Tie long hair up and back.

Wear safety glasses at all times to protect eyes from debris.

Wear gloves to protect your hands from sharp edges on plastic or steel parts.

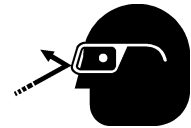
Wear steel-toed boots to help protect your feet from falling debris. Tuck in any loose or dangling shoestrings.

A respirator may be needed to prevent breathing potentially toxic fumes and dust.

Wear a hard hat to help protect your head.

Wear appropriate fall protection equipment when working at elevations greater than six feet (6').

**Eye Protection**



**Gloves**



**Steel-Toed Boots**



**Respirator**



**Hard Hat**



**Fall Protection**



The GSI recommends you contact your local power company and have a representative survey your dryer installation, so your wiring will be compatible with their system and you will have adequate power supplied to your unit.

Safety decals should be read and understood by all people in and around the dryer area. If the following safety decals are not displayed on your dryer or if they are damaged, contact the GSI for replacement:

### GSI Decals

1004 E. Illinois St.  
Assumption, IL. 62510  
Phone: 1-217-226-4421

**! CAUTION!**



**Airborne particles during operation. May impair vision and breathing. Do not enter when dryer is running.**

DC-1063

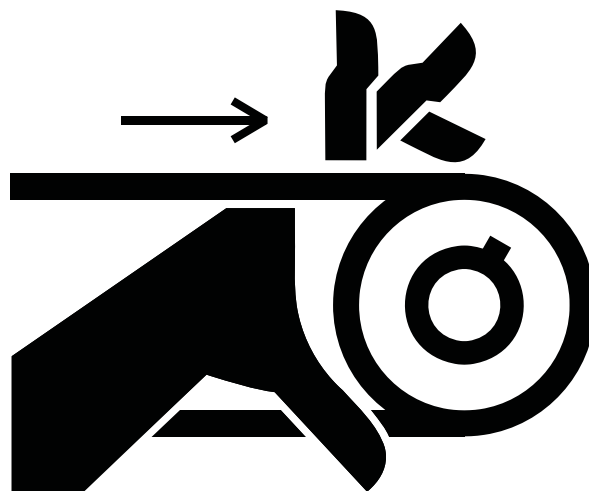
**! WARNING!**



**Flame and pressure beyond door. May cause serious injury. Do not enter when dryer is running.**

DC-1061

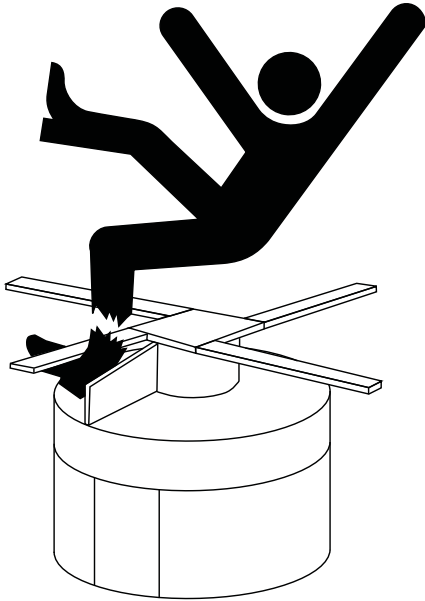
**! WARNING!**



**High speed belt drive operating overhead. Can cause serious injury. Keep head and hands clear. Do not enter when dryer is running.**

DC-1064

**! DANGER**



**AMPUTATION HAZARD.**  
Rotating drum below.  
Will cause serious injury  
or death.  
**LOCKOUT** power before  
entering or servicing.

DC-1060

**! DANGER**



**HIGH VOLTAGE.**

- Will cause serious injury or death.
- Lockout power before servicing.

DC-1224



**! DANGER**

**DO NOT STAND ON DRUM!**

- Rotating drum will cause serious injury or death.
- Disconnect power before servicing.

DC-1062



The purpose of this procedure is to provide detailed instructions for the installation and testing of an internal vaporizer coil assembly and its associated piping utilized on GSI or Zimmerman Tower Dryers and the T-Series Dryers that use liquid petroleum (LP) as the main fuel source.

## 4. Precautions and Limitations

---

- 4.1. The installation contractor and its installers shall have experience in properly identifying SCH 80 piping and fittings from SCH 40, cutting, threading and connecting black iron piping used on high pressure (200 PSIG) liquid petroleum (LP) systems.
- 4.2. Metals with sharp edges are present and installers should be aware of these at all steps during the installation process.
- 4.3. Verify that the main power to the dryer control panel (if installed) is de-energized and locked out.
- 4.4. Verify that the main gas train has been installed prior to performing this procedure, it must be installed to make the final connections for the vaporizer inlet and outlet piping and the 2" burner supply line must be verified as being vertically plumb on the outside of the dryer.

- 5.1. **PNEG-707**, Commercial Tower Dryer - GSI Construction Manual
- 5.2. **PNEG-1458**, T-Series Tower Dryer - Operation Manual
- 5.3. **PNEG-526**, Tower Dryer 2009 - GSI Operation and Service Manual

**NOTE:** *The PNEG manuals listed above in [Steps 5.1-5.3](#) are available at the following GSI website link; [http://www.grainsystems.com/literature/manuals/conditioning\\_manuals.php](http://www.grainsystems.com/literature/manuals/conditioning_manuals.php)*

- 5.4. **GSI Drawing #:** Vaporizer train

## 6. Measuring and Special Equipment Required

---

- 6.1. Nitrogen gas, large cylinder.
- 6.2. Regulator, single stage with CGA 580 fitting, nitrogen gas service with gauges. (Must regulate to 200 PSIG - [See Page 25.](#))
- 6.3. Hose with fittings on each end, high pressure (rated for > 500 PSIG).
- 6.4. Gauge, pressure (0-300 PSIG) or equivalent digital electronic pressure transducer or pressure transmitter with readout device.
- 6.5. Power cord 16/3 AWG or 14/3 AWG with 120 VAC 3 prong plug on one end, bare wires and wire nuts for the other end. (This will be used to power the 3/4" normally closed ASCO liquid line solenoid valve during leak testing in [Page 25](#), [Step 7.4.6 on Page 26.](#))
- 6.6. Leak test solution, industrial grade. (To detect nitrogen gas leaks.)
- 6.7. Pipe cutting and threading equipment for 2", 1-1/4" and 3/4" piping.
- 6.8. Pipe thread sealant, industrial grade with PTFE and/or teflon tape.

## 7.1. Dryer Data Information (from its GSI Data Plate)

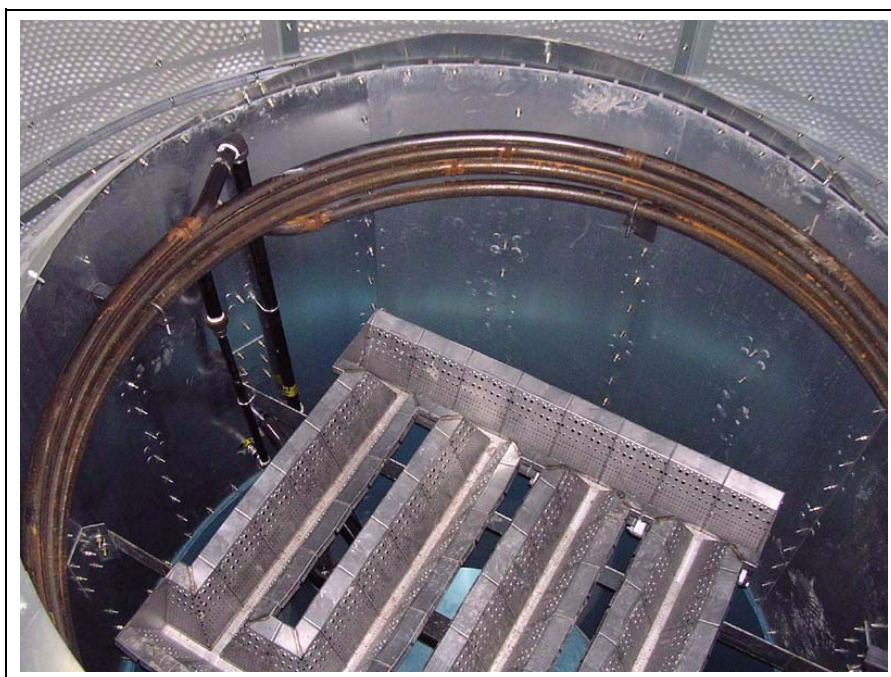
- 7.1.1. Record the model # of the dryer on the **TD-VIP-01 data sheet**. (Hereafter referred to as the data sheet.)
- 7.1.2. Record the serial # of the dryer on the data sheet.
- 7.1.3. Record the panel voltage required on the data sheet.
- 7.1.4. Record the panel current (amperage) on the data sheet.
- 7.1.5. Record the customer's name on the data sheet.
- 7.1.6. Record the dryer location on the data sheet.
- 7.1.7. Record the name of the company performing the vaporizer installation.

## 7.2. Vaporizer Hardware Verification

**NOTE:** *To perform the installation process in an efficient manner the hardware and piping that is necessary should be verified as being available and on site prior to starting the installation. Any items that were not located must be reported to the GSI project management group as soon as possible to schedule delivery.*

*Refer to vaporizer train drawing that is attached as appendix 'A' in this procedure for hardware items and their position in the train.*

- 7.2.1. Verify that there are (3 ea.) 21' lengths of 1-1/4" SCH 80 black iron pipe. (Record this on the data sheet.)
- 7.2.2. Verify that there are (3 ea.) 21' lengths of 3/4" SCH 80 black iron pipe. (Record this on the data sheet.)
- 7.2.3. Verify that there is actually a vaporizer coil assembly pre-mounted or positioned unsecured above the burner of the dryer. (*See Figure 7A.*) (Record this on the data sheet.)



**Figure 7A** Vaporizer Coil

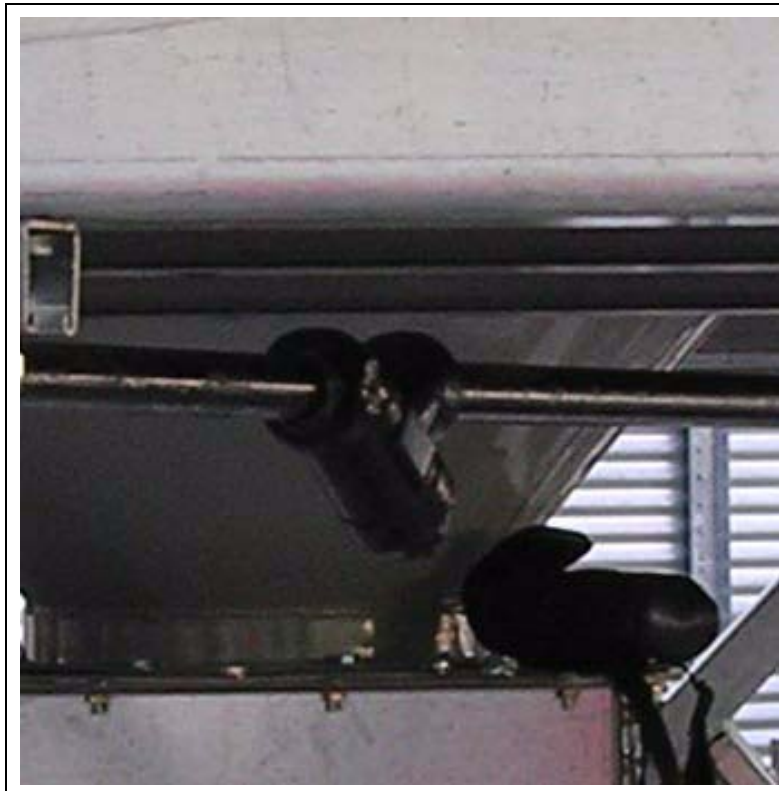
## 7. Procedure

7.2.4. Verify that there is brass 3/4" manual isolation ball valve in the kit. (See Figure 7B.) (Record this on the data sheet.)



**Figure 7B** 3/4" Manual Isolation Ball Valve

7.2.5. Verify that there is a 3/4" strainer assembly in the kit. (See Figure 7C.) (Record this on the data sheet.)



**Figure 7C** 3/4" In-Line Strainer Assembly

7.2.6. Verify that there is brass body 3/4" ASCO liquid solenoid valve in the kit. (See Figure 7D.) (Record this on the data sheet.)



**Figure 7D** 3/4" ASCO Liquid Line Solenoid Valve (Normally Closed)

7.2.7. Verify that there is brass 3/4" pressure relief valve and a 3/4" to 1/4" bushing in the kit. (See Figure 7E.) (Record this on the data sheet.)



**Figure 7E** 3/4" Brass Pressure Relief Valve Assembly

## 7. Procedure

- 7.2.8. Verify that there are (2 ea.) 2-1/2" diameter, liquid filled, 0-200 PSIG, 1/4" NPT bottom mount pressure gauges. Gauges will require (2 ea.) 3/4" to 1/4" reducing bushings that are mounted in the 3/4" SCH 80 tees. (See Figure 7F.) (Record this on the data sheet.)



**Figure 7F** Pressure Gauge (0-200 PSIG)

- 7.2.9. Verify that there are (3 ea.) 3/4" SCH 80 tees for the two (2) pressure gauges and one for the pressure relief valve mounting. (Record this on the data sheet.)
- 7.2.10. Verify that there are (3 ea.) 3/4" to 1/4" SCH 80 bushings for the two (2) pressure gauges and one for the pressure relief valve mounting. (Record this on the data sheet.)
- 7.2.11. Verify that there are at least (6 ea.) SCH 80 1-1/4" 90's (elbows). (Record this on the data sheet.)
- 7.2.12. Verify that there are at least (6 ea.) SCH 80 3/4" 90's (elbows). (Record this on the data sheet.)
- 7.2.13. Verify that there are at least (7 ea.) SCH 80 1-1/4" unions. (Record this on the data sheet.)
- 7.2.14. Verify that there are at least (7 ea.) SCH 80 3/4" unions. (Record this on the data sheet.)
- 7.2.15. Verify that there are at least (2 ea.) 3/4" SCH 80 45° and (2 ea.) 1-1/4" SCH 80 45° fittings. (Record this on the data sheet.)
- 7.2.16. Verify that there is at least (1 ea.) SCH 80 1-1/4" x 3/4" reducer. (Record this on the data sheet.)
- 7.2.17. Verify that there is at least (1 ea.) SCH 80 2" x 1-1/4" reducer. (Record this on the data sheet.)
- 7.2.18. Verify that there are at least (2 ea.) SCH 40 2" x 4" L nipples. (Record this on the data sheet.)
- 7.2.19. Verify that there are at least (2 ea.) SCH 40 2" x 24" L nipples. (Record this on the data sheet.)
- 7.2.20. Verify that there are at least (2 ea.) 2" U-bolts. (Record this on the data sheet.)
- 7.2.21. Verify that there are at least (8 ea.) 1-1/4" U-bolts. (Record this on the data sheet.)
- 7.2.22. Verify that there are at least (4 ea.) 3/4" U-bolts. (Record this on the data sheet.)



7.2.23. Verify that there are vaporizer coil mounting brackets (four (4) pair) in the kit or installed on the coil, if it has been installed at the factory. (See *Figure 7G* and *Figure 7H*.)

**7G + 7H = 1 pair**

(Record this on the data sheet.)



**Figure 7G** Vaporizer Mounting Bracket



**Figure 7H** Vaporizer Mounting Bracket

**NOTE:** There are various specific lengths of pipe that must be cut and threaded for all installations depending on how the pipe train has been installed and how the piping comes through the screen window for its vertical run down the dryer.

## 7. Procedure

### 7.3. Vaporizer Coil and Piping Installation

#### Information

The vaporizer coil is a very heavy piece of equipment; care should be taken in positioning it for mounting and the actual mounting process. The coil consists of four (4) coils with an inlet opening for the liquid propane and an outlet or discharge opening for the 'vaporized' heated propane gas. The vaporizer coil assembly is constructed of 1-1/4" SCH 80 thick walled continuous black iron tubing and has two (2) 1-1/4" male NPT threaded ends.

The 'inlet' for the vaporizer is the bottom of the coil assembly and the 'outlet' is the top tube of the vaporizer coil assembly. (See [Figure 7R on Page 24.](#))

The coil assembly itself is supported by the bracket assembly pieces of [Figure 7G and Figure 7H on Page 17](#). These pieces are bolted together in a vertical position and then bolted in four (4) equidistant quadrants of the inside burner can or burner housing assembly. These four (4) brackets will support the entire set of coils above the burner. The right angle piece of the bracket with four (4) holes is bolted to the burner can assembly in a vertical position while the other right angle end with seventeen (17) holes is for the 1-1/4" U-bolts to capture the outside edge of the coil assembly against the bracket. The slots allow for the brackets to spread apart and butt against the coils.

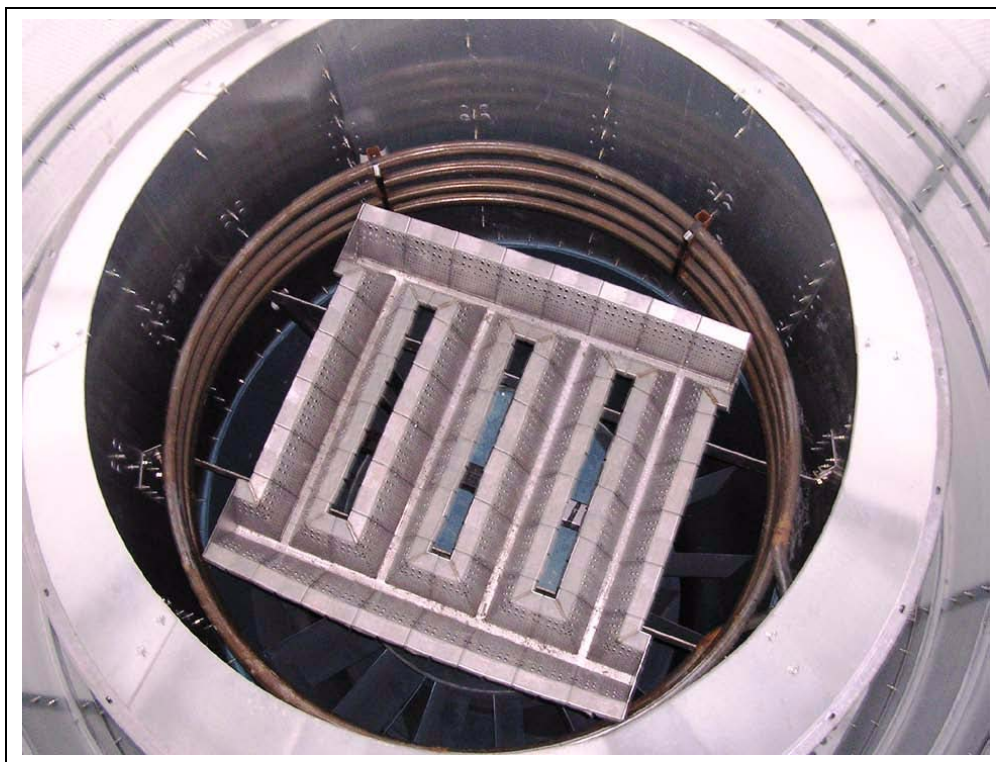


Figure 71 "Vaporizer Coil" that has not been Mounted above the Burner (Shipped Position)



**All threaded pipe fittings must be screwed tightly to prevent leaking. Industrial grade pipe thread compound with PTFE and/or teflon tape in combination with the thread compound shall be used and liberally applied to all threaded fittings. Large pipe wrenches (24" and 36") must be used to get the needed torque for tightening the fittings. Due to limited access to some spaces, piping pieces may need to be fabricated on the ground and then installed where a pipe wrench can be fully utilized for tightening.**

- 7.3.1. Before running any piping, verify that the 2" burner pipe that has been previously installed through the screen window and runs vertically along the outside dryer wall is plumb. This is very important for the keeping the vaporizer piping that will run adjacent to the 2" burner supply line also plumb. This makes for a professional looking installation when all three (3) pipes have been completed. The 2" line is in the middle of the arrangement, the 3/4" liquid line is to the left of the 2" line and the 1-1/4" line is to the right of the 2" line. (See Figure 7J.)

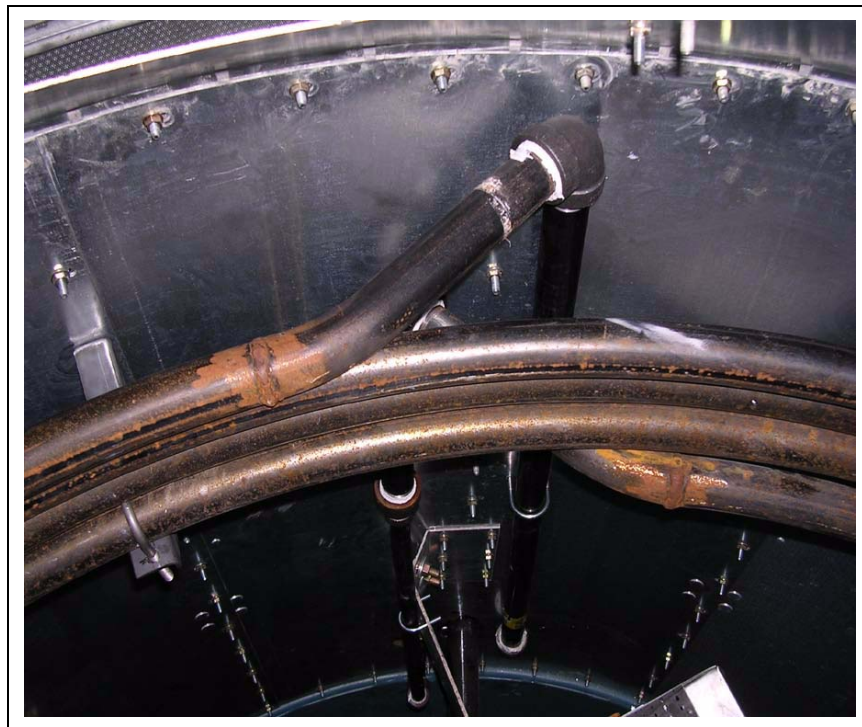


**Figure 7J** Vaporizer and Burner Piping Vertical Outside Run

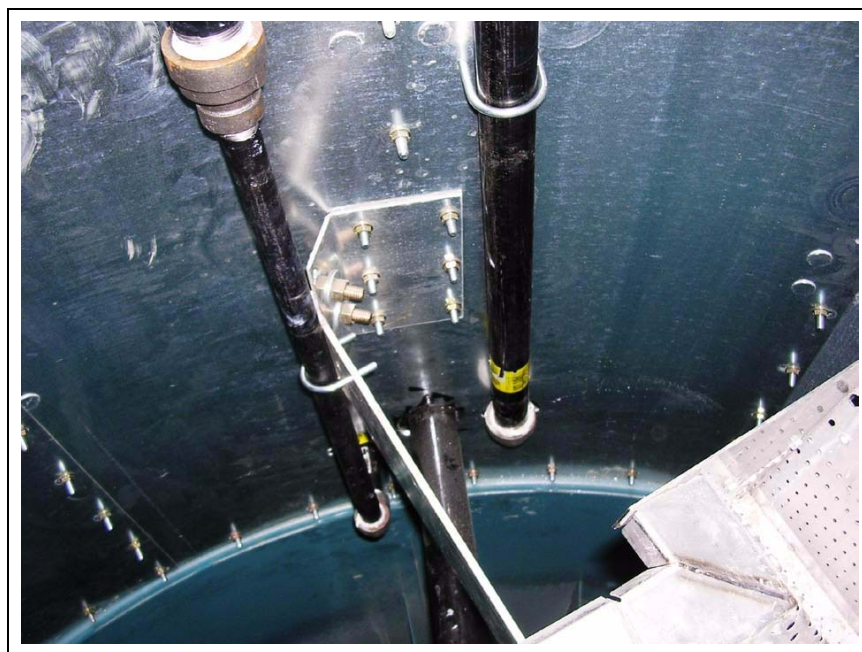
- 7.3.2. The vaporizer coil must be moved into a position where two (2) 1-1/4" SCH 80 90° elbows can be screwed on to the coils inlet and outlet MNPT threaded ends. These elbows must be facing downward when completed.
- 7.3.3. Move the coil into a position (if not already positioned) where the vaporizer inlet is to the left of the 2" burner line and the outlet is to the right of the 2" burner line. This as viewed looking downward above the burner on the same side as the burner piping vertical run. The vertical vaporizer lines begin from here.

## 7. Procedure

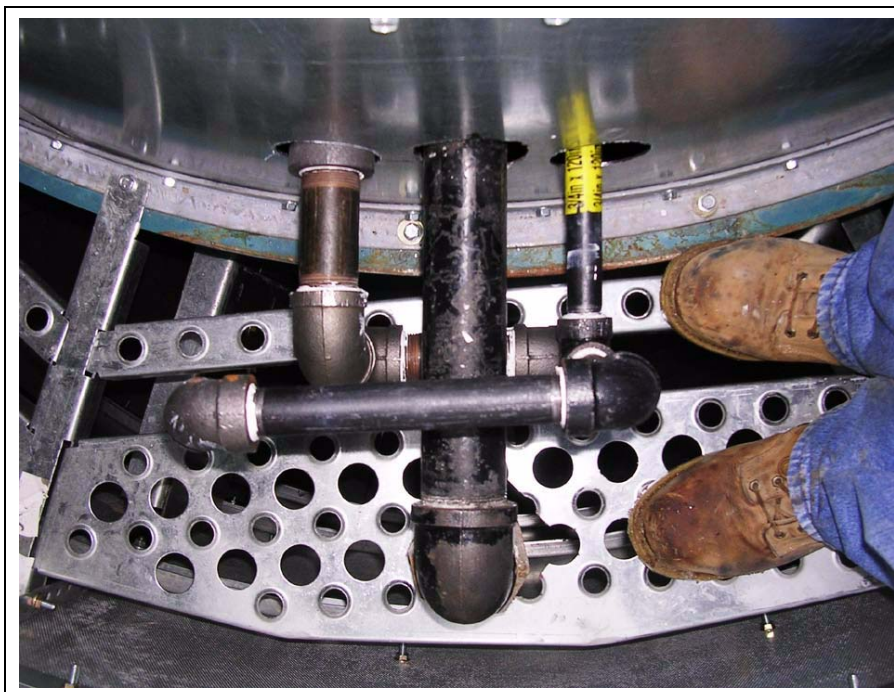
- 7.3.4. The inlet is the bottom of the coil and the outlet is the top, the lines can be crossed over outside the burner can as necessary to get the correct vertical arrangement started downward as soon as reasonably possible with the best positioning possible. There are no set rules or procedure for this, this is a 'contractor to field run' item depending on space, fittings and good judgement. See [Figure 7K](#), [Figure 7L below](#) and [Figure 7M on Page 21](#) for a dryer where the piping was crossed over to get the final vertical arrangement once the piping exited the screen window.



**Figure 7K** Piping has started on the opposite side of what is desired. Notice the 2" burner line at the bottom center of the photo.



**Figure 7L** The liquid line on the left has been reduced from 1-1/4" to the 3/4" diameter we need and the piping now exits the inside of the burner can with the 2" burner line located in the center at the bottom and the 1-1/4" vapor line on the right.



**Figure 7M** The piping has exited the inside of the burner can to the outside of the assembly structure. These pipes were then crossed at this point due to space and limited access. The 3/4" liquid line is now to the left of the 2" burner line and the 1-1/4" vapor line is to the right of the 2" burner line.

7.3.5. Vaporizer piping (3/4" and 1-1/4") is now run downward toward the window where the 2" burner line exits the dryer. Holes must be drilled, punched or cut for the pipes to penetrate the steel plate the divides the cooling section from the heating section. (See Figure 7N.)



**Figure 7N** Piping 3/4", 1-1/4" and 2", going through the steel divider plate. Notice the use of unions for piping connections.

## 7. Procedure

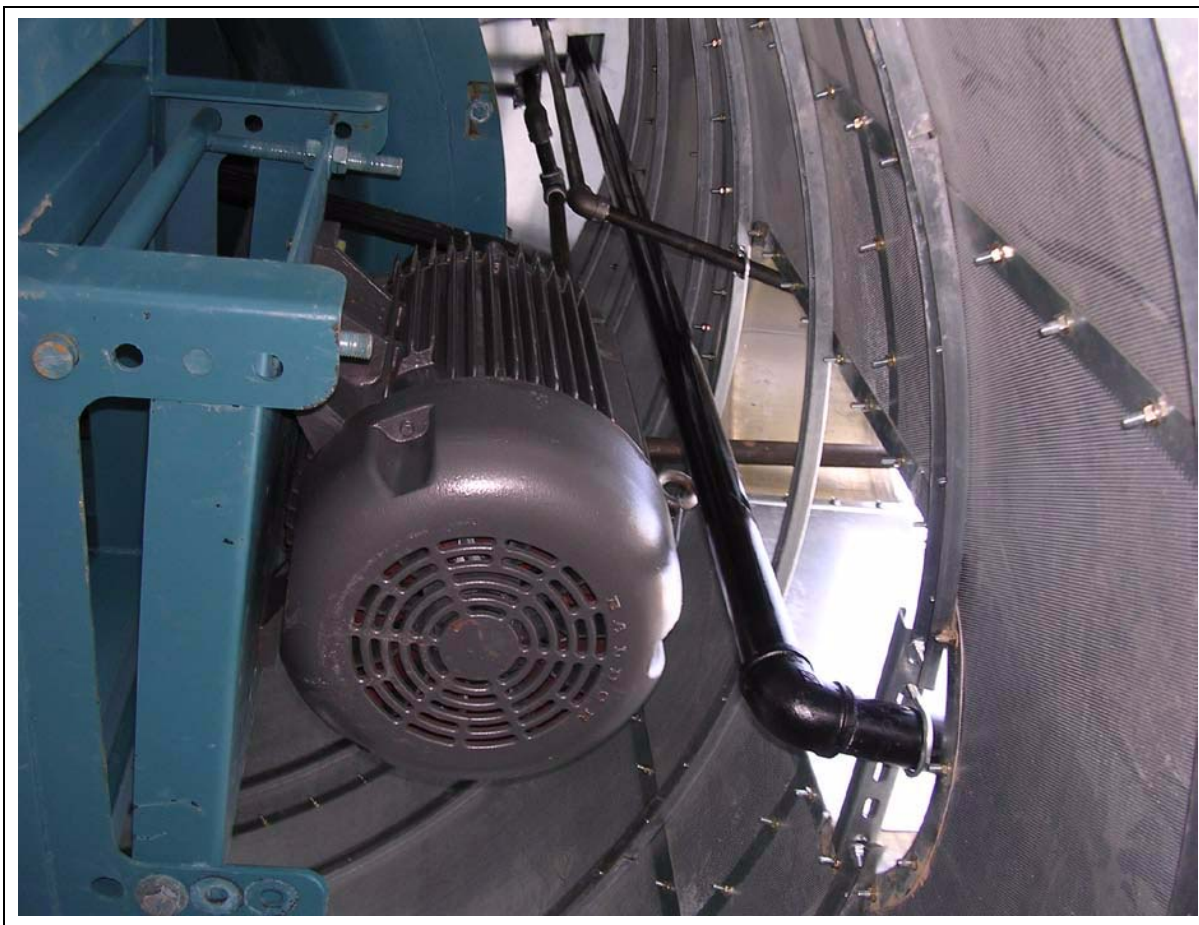
7.3.6. Vaporizer piping (3/4" and 1-1/4") continues downward toward the window where the 2" burner line exits the dryer. Make sure to anchor the piping at various locations to prevent piping from moving or creating stress points on fittings due to the vertical hanging weight of this SCH 80 thick walled pipe. U-bolts and uni-strut with clamps are normally used. [See Figure 7O, Figure 7P below and Figure 7Q on Page 23](#) for various anchoring examples.



**Figure 7O** Uni-Strut and Clamps



**Figure 7P**



**Figure 7Q** Piping Exiting the Window using U-Bolts and Support Brackets

- 7.3.7. Vaporizer piping (3/4" and 1-1/4") continues downward through the piping window opening and then vertically and in parallel with the 2" burner supply line toward the gas train.
- 7.3.8. Continue piping (3/4" and 1-1/4") downward to the gas train. Anchor the vertical run piping in at least two (2) locations on the outside of the dryer. Uni-strut and clamps are commonly used for this.
- 7.3.9. Connect the 3/4" vaporizer line to the gas train liquid supply line. This will allow this section of the gas train supply piping and associated components to be pressure tested in [Figure 7R on Page 24](#).
- 7.3.10. Install a 2" to 1/4" reducing bushing at the end of the 2" to 1-1/4" bell reducer for the connection of a test gauge. Some test gauges may have a 3/8" MNPT fitting, if so reduce down to allow a for the test gauge connection size. ([See Figure 7R on Page 24.](#))
- 7.3.11. Install the 0-300 PSIG test gauge at the reducer bushing fitting of the preceding step. Verify this gauge has a 0 PSIG reading.
- 7.3.12. Proceed to vaporizer high pressure leak testing [on Page 25](#).

# 7. Procedure

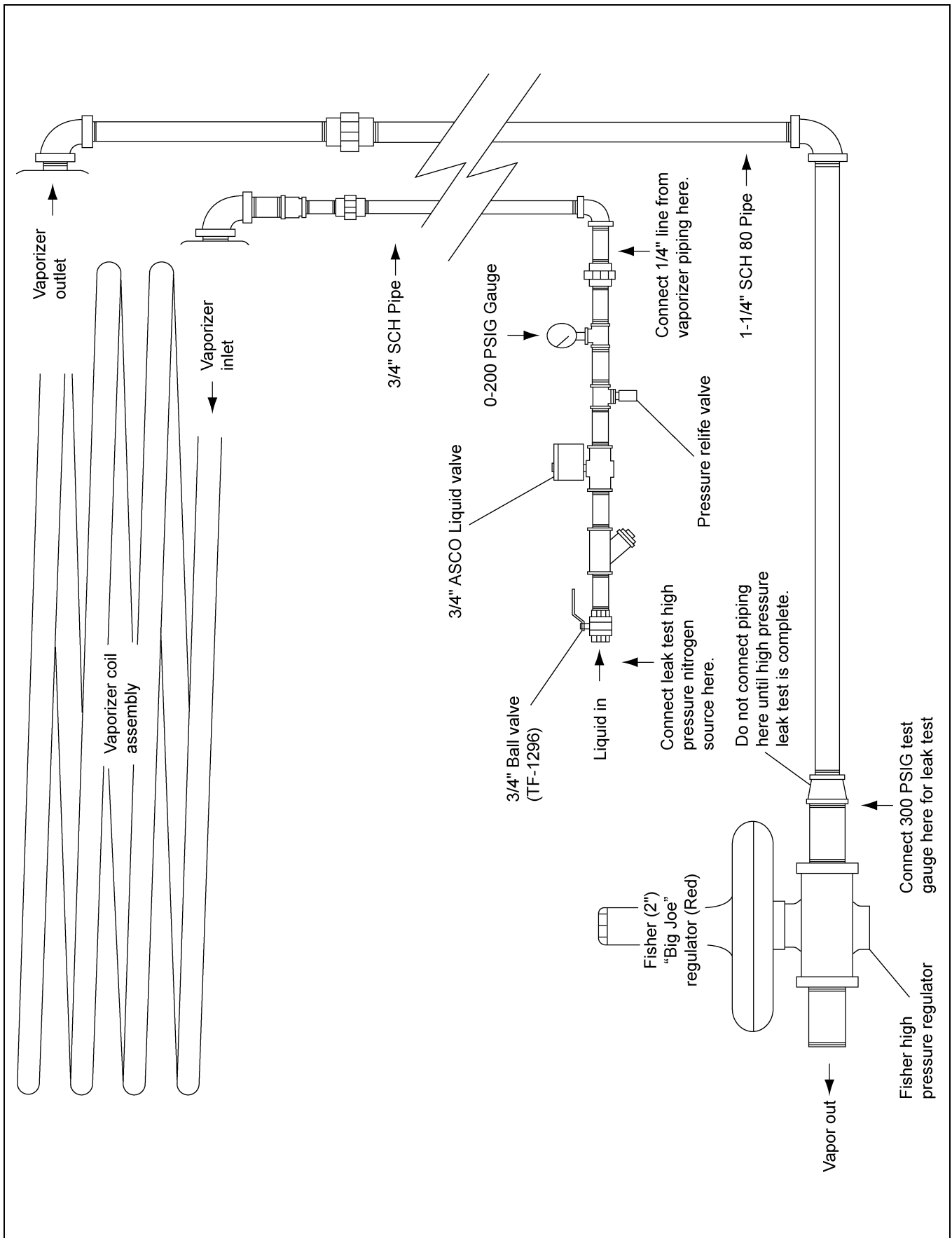


Figure 7R Vaporizer Train Piping



## 7.4. Vaporizer High Pressure Leak Testing

Record all steps of this section on the data sheet.

### Testing Information

The vaporizer coil and its associated piping play a vital role in the operation and efficiency of the dryer and a safety concern for those that operate the dryer. Any leaks pose a potential for disaster and inefficient operation. This leak test is a way of identifying leaks, large or small, prior to the initial start-up and operation of the dryer. This test can also be performed at any time during the life of the dryer to verify no leaks have developed. The performance of this test is also a final verification that any leaks that were found during this test have been repaired.

The incoming liquid propane (LP) pressure to the dryer is variable and dependent on how full the customer's storage tank(s) is, the ambient temperature and how much sun light or shade the tank is subjected to during the course of a day during dryer usage. Pressures may range from 40 PSIG on very cold days and 120 PSIG on very warm days with the tank receiving direct sun light for much of the day. Therefore the vaporizer coil and piping could be subjected to pressures as high as 120 PSIG. It is the intent of this test to pressurize for leaks at approximately 1.5 times the highest operating pressure of the vaporizer system. Therefore our target test pressure will be  $120 \text{ PSIG} \times 1.5 = 180 \text{ PSIG}$ . To go in a conservative direction the test pressure that will be used for this procedure will be **200 PSIG (+/- 2)**. The test acceptance criterion is to hold the desired pressure for 3 minutes.

Most common used portable air compressors can only achieve and sustain 80-90 PSIG; this does not meet the desired target test pressure of 200 PSIG. The nitrogen bottle, gas regulator, high pressure hose and 300 PSIG test gauge or instrument of [Steps 6.1-6.4 on Page 12](#) are used for the performance of this test.

Refer to [Figure 7R on Page 24](#) for locations of connections.

- 7.4.1. Install a 2" to 1/4" reducing bushing at the end of the 2" to 1-1/4" bell reducer for the connection of a test gauge. Some test gauges may have a 3/8" or 1/2" MNPT fitting, if so, reduce down to allow a for the test gauge connection size. ([See Figure 7R on Page 24.](#))
- 7.4.2. Connect the nitrogen gas regulator to the nitrogen bottle. Turn the regulator handle in a counterclockwise (CCW) until no resistance is felt on the handle. This is to make sure the regulator has no output pressure when we open the nitrogen bottle's valve later in this section. The regulator's handle will be turned clockwise (CW) later in this section to give the desired pressure output.
- 7.4.3. Connect one end of a high pressure hose assembly (rated for >300 PSIG) to the output side of the gas regulator installed on the bottle of [Step 7.4.2](#).
- 7.4.4. Connect the remaining end of the high pressure hose assembly (rated for >300 PSIG) to the inlet side of the 3/4" gas train liquid supply high pressure isolation valve. The 3/4" valve is shown in [Figure 7B on Page 14](#).
- 7.4.5. Tighten both ends of the hose connected in [Steps 7.4.3 and 7.4.4](#). This is where the test pressure of 200 PSIG will be input.

## 7. Procedure

### ASCO 3/4" liquid valve solenoid.

**NOTE:** *The ASCO 3/4" liquid valve is a normally closed (N.C.) valve and it must be 'energized to open' for the performance of this test. The valve is activated by 120 volts AC applied to the two (2) red leads coming from the body of the valve. There will actually be three (3) wires on the solenoid, two (2) reds and one green wire. (See Figure 7D on Page 15.) Depending on when the vaporizer is installed; the electrical portion of the dryer may have been completed prior to this test. The ASCO wires may already be in conduit and connected to the panel wiring. Regardless of that this test can still be performed. If the electrical contractor has not completed their portion of the wiring, the wiring will be exposed as in Figure 7D on Page 15. If the electrical contractor has finished the wiring there should be a 1/2" conduit LB or tee where the wires from the solenoid valve have been terminated or connected with wire nuts. The wire nuts can be removed from the solenoid's two (2) red wires and one green wire at this location. Note any wire colors and how they were terminated to ensure they are re-connected exactly 'as found'.*

- 7.4.6. Connect the 3 prong power cord of 6.5 to the ASCO 3/4" liquid valve wires that were identified in the **note** preceding this step. Connect the wires as delineated in the following steps. Any field wires that are disconnected, if applicable will need to be re-connected after the test completion. Note the wire connections and colors.
- 7.4.7. Connect the 3 prong power cord's **black** wire to one of the two (2) solenoid's **red** wires by using an orange wire nut.
- 7.4.8. Connect the 3 prong power cord's **white** wire to the solenoid's remaining **red** wire by using an orange wire nut.
- 7.4.9. Connect the 3 prong power cord's **green** ground wire to the solenoid's **green** wire by using an orange wire nut.
- 7.4.10. Connect or plug the cord's 3 prong male end into a powered or live 120 volt AC receptacle or extension cord.
- 7.4.11. Verify the ASCO liquid solenoid energized open by the audible click or pop at the solenoid valve. Record that this action occurred on the data sheet.

**NOTE:** *Most large nitrogen cylinders when full are approximately 2000-2500 PSIG depending on the overfill percentage. For the purpose of this test the cylinder bottle's pressure should be at least 500-800 PSIG to allow for enough volume to fill the vaporizer coils and piping and pressure depending on how many leaks there are and how long the system is pressurized.*
- 7.4.12. Slowly open the nitrogen cylinder's valve by turning the cylinder's hand valve knob in a counterclockwise (CCW) direction. Verify there is a pressure indication on the regulator's high pressure gauge. Record the pressure reading on the regulator's high pressure gauge on the data sheet.
- 7.4.13. Close or verify closed the brass 3/4" liquid line manual isolation valve where the nitrogen hose is connected.
- 7.4.14. Slowly adjust the regulator mounted on the nitrogen cylinder by turning the regulator's handle in clockwise (CW) direction. This should start providing a pressure indication on the regulator's low pressure gauge. Continue turning the regulator handle until there is approximately 200 PSIG on the regulator's low pressure gauge. Record the pressure reading on the regulator's low pressure gauge on the data sheet.
- 7.4.15. Using leak detection solution, verify there are no leaks on the nitrogen cylinder's connection at the regulator and the regulator gauges or at the hose connection from the regulator or at the connection to the manual 3/4" manual isolation valve. Repair any leaks that were found before proceeding to the next step.

- 7.4.16. Verify that the closed 3/4" manual isolation valve is not leaking, by observing that there is still 0 PSIG indicated on the test gauge installed in [Step 7.3.11 on Page 23](#). If there is pressure indicated on the test gauge the manual 3/4" isolation valve will need replaced. Notify the cognizant GSI project manager for the correct valve replacement. Record the pressure reading on the data sheet.
- 7.4.17. Slowly open the 3/4" manual isolation valve and observe there is a pressure reading on the 0-300 PSIG test gauge. The pressure should increase on the test gauge to approximately 200 PSIG, as was set on the regulator gauge of [Step 7.4.14 on Page 26](#), provided there are no large or open ended leaks somewhere in the vaporizer system. The nitrogen cylinder regulator may need to be adjusted to get to the desired test pressure of 200 PSIG. Record the test gauge pressure reading on the data sheet.
- 7.4.18. Using leak detection solution and with the system still pressurized, go to all fittings from the vaporizer coil connections and inside and outside connections on the vaporizer system and the liquid line gas train piping from the 3/4" manual isolation valve where the test pressure begins. Spray or swab the solution liberally and identify any bubbles as leaks that need repaired and the absence of bubbles as a tight non-leaking connection. Record on the data sheet how many leaks were initially identified in the performance of this step.



***Prior to attempting any repair of identified leaks, remove the pressure in the system by closing the valve on the nitrogen cylinder and venting the pressure on the regulator by turning the handle in a CCW direction. Observe any pressure that may remain in the system by looking at the regulator gauges, the test gauge and the 2-1/2" liquid filled 0-200 PSIG liquid line gauge. These gauges must indicate 0 PSIG or pressure is still present in the system. Do not loosen any fittings or disconnect any lines with pressure on the system.***

- 7.4.19. Repair any leaks that were identified. Pressurize the system again as described in the previous steps and repeat [Step 7.4.18](#) until no bubbles are present, complete this prior to going to [Step 7.4.20](#).
- 7.4.20. To verify that all leaks have been repaired and that the vaporizer system is a total leak free closed loop system, pressurize the system to 200 PSIG (+/- 2) as indicated on the test gauge. Adjust the regulator to reach this pressure. Record this test pressure value on the data sheet as the beginning (0 minute) test pressure. Note the time for the beginning of this 3 minutes leak test.
- 7.4.21. Close the manual 3/4" liquid line valve.
- 7.4.22. Close the nitrogen bottle supply valve.
- 7.4.23. Vent the regulator by turning the regulator handle or knob CCW until no pressure is observed on the regulator's gauges. The regulator handle or knob may need to be turned CW with the nitrogen cylinder's valve still closed to completely vent any remaining pressure.
- 7.4.24. Verify the pressure that was recorded in [Step 7.4.20](#) has remained stable and has not decreased or slowly decayed. If the pressure has dropped or decreased in value, as indicated on the test gauge, a leak is still present in the system and must be repaired prior to going to [Step 7.4.25](#).
- 7.4.25. The desired test pressure of 200 PSIG (+/- 2) must be held for 3 minutes without decreasing from the beginning pressure of [Step 7.4.20](#) to the 3 minutes time for a successful leak test. Record the test pressure from the test gauge after 3 minutes.
- 7.4.26. Repeat any of the steps from [Step 7.4.12 on Page 26](#) through [Step 7.4.25](#) to achieve the acceptable leak rate test criteria. Record the 'as left' leak rate test times and test gauge pressures on the data sheet. This completed step should be signed and dated on the data sheet by the person(s) performing the test and a supervisor.

## 7. Procedure

---

- 7.4.27. Remove the pressure from the vaporizer loop by disconnecting the nitrogen supply hose from the 3/4" manual isolation valve and then slowly opening the valve that has been closed since [Step 7.4.21 on Page 27](#). The test gauge should indicate 0 PSIG when the pressure has been vented.
- 7.4.28. Close the manual 3/4" liquid line valve and remove any fittings that remain after the nitrogen hose was removed in [Step 7.4.27](#). Record this action on the data sheet.
- 7.4.29. Remove the 0-300 PSIG test gauge and any fittings installed in the 2" x 1" reducer fitting. Record this action on the data sheet.
- 7.4.30. Remove the 3 prong 120V AC power cord from the receptacle and then disconnect the wires that were connected to the ASCO 3/4" liquid line solenoid leads. Record this action on the data sheet.
- 7.4.31. If applicable, re-connect the solenoid lead wires exactly as they were found to the field wires that were disconnected from the ASCO 3/4" liquid line solenoid in [Step 7.4.6 on Page 26](#). Record this action on the data sheet.
- 7.4.32. Remove the high pressure hose and the regulator from the nitrogen cylinder and replace the protective cap over the cylinder's valve. Record this action on the data sheet.
- 7.4.33. Connect the vaporizer 2" female fitting to the system's high pressure regulator's inlet side at the 2" nipple. Verify this connection is as tight as possible. Record this action on the data sheet.
- 7.4.34. Verify all parts of the data sheet have been completed and signed. Copies of the data sheet should be sent to the GSI project manager for their record keeping.

## TD-VIP-01 Data Sheet

### Dryer Information Data (GSI Data Plate)

Step #	Information	Recorded Data	Initials/Date
<a href="#">7.1.1 on Page 13</a>	Model #		
<a href="#">7.1.2 on Page 13</a>	Serial #		
<a href="#">7.1.3 on Page 13</a>	Panel voltage volts AC		
<a href="#">7.1.4 on Page 13</a>	Panel current amps AC		
<a href="#">7.1.5 on Page 13</a>	Customer's name		
<a href="#">7.1.6 on Page 13</a>	Dryer location city and state		

### Vaporizer Hardware Verification Data

Step #	Information	Recorded Data	Initials/Date
<a href="#">7.2.1 on Page 13</a>	(3 ea.) 21' Lengths of 1-1/4" SCH 80 pipe		
<a href="#">7.2.2 on Page 13</a>	(3 ea.) 21' Lengths of 3/4" SCH 80 pipe		
<a href="#">7.2.3 on Page 13</a>	Vaporizer coil in-place		
<a href="#">7.2.4 on Page 14</a>	3/4" Brass manual isolation valve		
<a href="#">7.2.5 on Page 14</a>	3/4" Strainer assembly		
<a href="#">7.2.6 on Page 15</a>	3/4" ASCO Liquid solenoid valve		
<a href="#">7.2.7 on Page 15</a>	3/4" Brass pressure relief valve and 3/4" x 1/4" bushing		
<a href="#">7.2.8 on Page 16</a>	(2 ea.) 0-200 PSIG Pressure gauges		
<a href="#">7.2.9 on Page 16</a>	(3 ea.) 3/4" SCH 80 tees		
<a href="#">7.2.10 on Page 16</a>	(3 ea.) 3/4"-1/4" SCH 80 Bushings		
<a href="#">7.2.11 on Page 16</a>	(6 ea.) 1-1/4" SCH 80 90's		
<a href="#">7.2.12 on Page 16</a>	(6 ea.) 3/4" SCH 80 90's		
<a href="#">7.2.13 on Page 16</a>	(7 ea.) 1-1/4" SCH 80 Unions		
<a href="#">7.2.14 on Page 16</a>	(7 ea.) 3/4" SCH 80 Unions		
<a href="#">7.2.15 on Page 16</a>	(2 ea.) 3/4" and 1-1/4" SCH 80 45's		
<a href="#">7.2.16 on Page 16</a>	(1 ea.) 1-1/4" x 3/4" SCH 80 Reducer		
<a href="#">7.2.17 on Page 16</a>	(1 ea.) 2" x 1-1/4" SCH 80 Reducer		
<a href="#">7.2.18 on Page 16</a>	(2 ea.) 2" x 4" L SCH 40 Nipples		
<a href="#">7.2.19 on Page 16</a>	(2 ea.) 2" x 24" L SCH 40 Nipples		
<a href="#">7.2.20 on Page 16</a>	(2 ea.) 2" U-Bolts		
<a href="#">7.2.21 on Page 16</a>	(8 ea.) 1-1/4" U-Bolts		
<a href="#">7.2.22 on Page 16</a>	(4 ea.) 3/4" U-Bolts		
<a href="#">7.2.23 on Page 17</a>	(Four (4) pair) Vaporizer coil mounting brackets		

## 8. TD-VIP-01 Data Sheet Selection

### Vaporizer Pressure Leak Test Data

Step #	Information	Recorded Data	Initials/Date
<a href="#">7.4.1 on Page 25</a>	Bushing installed to accept the 300 PSIG test gauge.		
<a href="#">7.4.2 on Page 25</a>	Regulator connected to nitrogen cylinder and handle or knob turned fully CCW.		
<a href="#">7.4.3 on Page 25</a>	High pressure hose connected to the regulator.		
<a href="#">7.4.4 on Page 25</a>	Hose end connected to the 3/4" manual isolation valve input.		
<a href="#">7.4.5 on Page 25</a>	Hose ends tightened at regulator and manual valve.		
<a href="#">7.4.6 on Page 26</a>	Power cord available and ready to connect to the 3/4" ASCO solenoid valve wires.		
<a href="#">7.4.7 on Page 26</a>	Power cord <u>black</u> wire connected to one of the ASCO <u>red</u> wires.		
<a href="#">7.4.8 on Page 26</a>	Power cord <u>white</u> wire connected to the remaining ASCO <u>red</u> wire.		
<a href="#">7.4.9 on Page 26</a>	Power cord green wire connected to the ASCO green wire.		
<a href="#">7.4.10 on Page 26</a>	Power cord 3 prong male end plugged in a live 120V receptacle.		
<a href="#">7.4.11 on Page 26</a>	Audible click or popping sound heard at 3/4" ASCO solenoid.		
<a href="#">7.4.12 on Page 26</a>	Regulator high pressure gauge pressure reading.	PSIG	
<a href="#">7.4.13 on Page 26</a>	3/4" Manual isolation valve 'CLOSED'.		
<a href="#">7.4.14 on Page 26</a>	Regulator low pressure gauge pressure reading.	PSIG	
<a href="#">7.4.15 on Page 26</a>	No leaks between nitrogen cylinder and input of 3/4" manual valve.		
<a href="#">7.4.16 on Page 27</a>	Test gauge reading with 3/4" manual valve 'CLOSED'.	PSIG	
<a href="#">7.4.17 on Page 27</a>	Test gauge reading with 3/4" manual valve 'OPEN'.	PSIG	
<a href="#">7.4.18 on Page 27</a>	Number of leaks initially found before repairs.	Leaks	
<a href="#">7.4.19 on Page 27</a>	Leaks of <a href="#">7.4.18 on Page 27</a> repaired (If applicable).		
<a href="#">7.4.20 on Page 27</a>	1. Regulator adjusted to test pressure. 2. 0 Minute test time.	1. _____ PSIG 2. _____ Time	
<a href="#">7.4.21 on Page 27</a>	3/4" Manual isolation valve 'CLOSED'.		
<a href="#">7.4.22 on Page 27</a>	Nitrogen cylinder supply valve 'CLOSED'.		
<a href="#">7.4.23 on Page 27</a>	Regulator vented and no pressure indicated on regulator gauges.		
<a href="#">7.4.24 on Page 27</a>	Test gauge pressure reading during this step.	PSIG	
<a href="#">7.4.25 on Page 27</a>	1. Test pressure of <a href="#">Step 7.4.20 on Page 16</a> . 2. 3 Minute test time after time of <a href="#">Step 7.4.20 on Page 16</a> .	1. _____ PSIG 2. _____ Time	
<a href="#">7.4.26 on Page 27</a> 'As found' beginning of 3 minutes	1. Regulator adjusted to test pressure. 2. 0 Minute test time.	1. _____ PSIG 2. _____ Time	
<a href="#">7.4.26 on Page 27</a> 'As left' end of 3 minutes	1. Regulator adjusted to test pressure. 2. 0 Minute test time.	1. _____ PSIG 2. _____ Time	

**Signatures for Completion of Leak Test**

Test Technician: \_\_\_\_\_ Date: \_\_\_\_\_

Supervisor: \_\_\_\_\_ Date: \_\_\_\_\_

**Vaporizer Pressure Leak Test Data (Continued)**

Step #	Information	Recorded Data	Initials/Date
<a href="#">7.4.27 on Page 28</a>	1. Disconnect hose at 3/4" manual valve. 2. 'OPEN' the valve. 3. Verify 0 PSIG on test gauge.	1. 2. 3. PSIG	1. 2. 3.
<a href="#">7.4.28 on Page 28</a>	3/4" Manual isolation valve 'CLOSED'.		
<a href="#">7.4.29 on Page 28</a>	0-300 PSIG test gauge and fittings removed from 2" x 1" reducer.		
<a href="#">7.4.30 on Page 28</a>	3 Prong cord removed from receptacle and wires disconnected from ASCO solenoid.		
<a href="#">7.4.31 on Page 28</a>	Solenoid wires re-connected to field wires (If applicable) mark as 'N/A' if not.		
<a href="#">7.4.32 on Page 28</a>	High pressure hose and regulator removed from nitrogen cylinder.		
<a href="#">7.4.33 on Page 28</a>	Connect the 2" x 1" fitting from the vaporizer loop to the 2" inlet fitting of the high pressure regulator.		
<a href="#">7.4.34 on Page 28</a>	Verify all steps of this section are complete and initialed and signed.		

**Test Performers Names and Completion Date**

Test Performer Name(s)	Company Name	Test Completion Date	Test Performer's Initials

---

# NOTES



## GSI Group, LLC Limited Warranty

The GSI Group, LLC ("GSI") warrants products which it manufactures to be free of defects in materials and workmanship under normal usage and conditions for a period of 12 months after sale to the original end-user or if a foreign sale, 14 months from arrival at port of discharge, whichever is earlier. The end-user's sole remedy (and GSI's only obligation) is to repair or replace, at GSI's option and expense, products that in GSI's judgment, contain a material defect in materials or workmanship. Expenses incurred by or on behalf of the end-user without prior written authorization from the GSI Warranty Group shall be the sole responsibility of the end-user.

### Warranty Extensions:

The Limited Warranty period is extended for the following products:

	Product	Warranty Period	
<b>AP Fans and Flooring</b>	Performer Series Direct Drive Fan Motor	3 Years	* Warranty prorated from list price: 0 to 3 years - no cost to end-user 3 to 5 years - end-user pays 25% 5 to 7 years - end-user pays 50% 7 to 10 years - end-user pays 75%
	All Fiberglass Housings	Lifetime	
	All Fiberglass Propellers	Lifetime	
<b>Cumberland Feeding/Watering Systems</b>	Feeder System Pan Assemblies	5 Years **	** Warranty prorated from list price: 0 to 3 years - no cost to end-user 3 to 5 years - end-user pays 50%
	Feed Tubes (1-3/4" and 2.00")	10 Years *	
	Centerless Augers	10 Years *	
	Watering Nipples	10 Years *	
<b>Grain Systems</b>	Grain Bin Structural Design	5 Years	† Motors, burner components and moving parts not included. Portable dryer screens included. Tower dryer screens not included.
<b>Grain Systems Farm Fans Zimmerman</b>	Portable and Tower Dryers	2 Years	
	Portable and Tower Dryer Frames and Internal Infrastructure †	5 Years	

GSI further warrants that the portable and tower dryer frame and basket, excluding all auger and auger drive components, shall be free from defects in materials for a period of time beginning on the twelfth (12<sup>th</sup>) month from the date of purchase and continuing until the sixtieth (60<sup>th</sup>) month from the date of purchase (extended warranty period). During the extended warranty period, GSI will replace the frame or basket components that prove to be defective under normal conditions of use without charge, excluding the labor, transportation, and/or shipping costs incurred in the performance of this extended warranty.

### Conditions and Limitations:

THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE LIMITED WARRANTY DESCRIPTION SET FORTH ABOVE. SPECIFICALLY, GSI MAKES NO FURTHER WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE IN CONNECTION WITH: (I) PRODUCT MANUFACTURED OR SOLD BY GSI OR (II) ANY ADVICE, INSTRUCTION, RECOMMENDATION OR SUGGESTION PROVIDED BY AN AGENT, REPRESENTATIVE OR EMPLOYEE OF GSI REGARDING OR RELATED TO THE CONFIGURATION, INSTALLATION, LAYOUT, SUITABILITY FOR A PARTICULAR PURPOSE, OR DESIGN OF SUCH PRODUCTS.

GSI shall not be liable for any direct, indirect, incidental or consequential damages, including, without limitation, loss of anticipated profits or benefits. The sole and exclusive remedy is set forth in the Limited Warranty, which shall not exceed the amount paid for the product purchased. This warranty is not transferable and applies only to the original end-user. GSI shall have no obligation or responsibility for any representations or warranties made by or on behalf of any dealer, agent or distributor.

GSI assumes no responsibility for claims resulting from construction defects or unauthorized modifications to products which it manufactured. Modifications to products not specifically delineated in the manual accompanying the equipment at initial sale will void the Limited Warranty.

This Limited Warranty shall not extend to products or parts which have been damaged by negligent use, misuse, alteration, accident or which have been improperly/inadequately maintained. This Limited Warranty extends solely to products manufactured by GSI.

Prior to installation, the end-user has the responsibility to comply with federal, state and local codes which apply to the location and installation of products manufactured or sold by GSI.

This equipment shall be installed in accordance with the current installation codes and applicable regulations, which should be carefully followed in all cases. Authorities having jurisdiction should be consulted before installations are made.

**G S I G R O U P**



**GSI Group**  
**1004 E. Illinois St.**  
**Assumption, IL 62510-0020**  
**Phone: 1-217-226-4421**  
**Fax: 1-217-226-4420**  
**[www.gsiag.com](http://www.gsiag.com)**