



Atlas<sup>®</sup> Fuel Systems

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# Site Preparation Manual

## Computer Programs and Documentation

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## Federal Communications Commission (FCC) Warning

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

## Approvals

Gasboy, Greensboro, is an ISO 9001:2000 registered facility.

### Underwriters Laboratories (UL):

UL File#	Products listed with UL
MH4314	All dispensers and self-contained pumping units
MH10581	Key control unit, Model GKE-B Series Card reader terminals, Models 1000, 1000P Site Controller, Model 2000S CFN Series Data entry terminals, Model TPK-900 Series Fuel Point Reader System

### California Air Resources Board (CARB):

Executive Order #	Product
G-70-52-AM	Balance Vapor Recovery
G-70-150-AE	VaporVac

## National Conference of Weights and Measures (NCWM) - Certificate of Compliance (CoC):

Gasboy pumps and dispensers are evaluated by NCWM under the National Type Evaluation Program (NTEP). NCWM has issued the following CoC:

CoC#	Product	Model #	CoC#	Product	Model #	CoC#	Product	Model #
95-179	Dispenser	9100 Retail Series, 8700 Series, 9700 Series	91-019	Dispenser	9100 Commercial Series	05-002	Atlas	8700K, 8800K, 9100K, 9200K, 9800K
95-136	Dispenser	9800 Series	91-057	Controller	1000 Series FMS, 2000S-CFN Series			

## Trademarks

### Non-registered trademarks

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Infinity™

### Registered trademarks

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Atlas®  
Fuel Point®  
Gasboy®  
Keytrol®  
Slimline®

### Service mark

GOLD<sup>SM</sup>

Additional US and foreign trademarks pending.

All product names, logos, and brands are the property of their respective owners and are for identification purposes only. Use of these names, logos, and brands does not imply endorsement.



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# 1 – Introduction

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## Read this First

### Purpose

This manual gives you information to prepare a site for Gasboy® Atlas® Series pumps or dispensers. It provides the following:

- Safety information
- Equipment required for installation
- Station layout information
- Electrical requirements
- Plumbing requirements

Perform all site preparation in accordance with NFPA 30A, NFPA 70®, and applicable national, state, and local codes/regulations. For non-US installation, other codes may apply. Plan your site ahead of time. Use experienced, licensed personnel that practice accurate, safe construction techniques. Time, expense, and extra effort in the early stages of preparing a site can eliminate problems in later stages. Careful site preparation provides a sound troubleshooting framework for field repairs. For additional information, consult manufacturer installation instructions. This manual does not list all requirements for installation of outside vendor components.

### Who Must Use this Manual

This manual is intended for individuals who are trained in the construction of gasoline stations. If you do not have experience with this type of construction (gasoline stations), contact a licensed, trained engineer or contractor, or Gasboy Authorized Service Contractor (ASC).

### Whom to Contact

<b>For this Type of Information</b>	<b>Call the Following Phone Numbers</b>
To schedule training on Gasboy products	Your local Gasboy distributor
For technical assistance	Gasboy Technical Support at 1-800-444-5529
For warranty service and information	Gasboy Call Center at 1-888-800-7498
For explanation of Gasboy's warranty policy	Contact your local Gasboy distributor
For additional technical literature, for example, installation, parts manuals, and other documents	Gasboy Literature Department at 1-336-547-5661
Solutions, Products, Services, and Support	<a href="http://www.gasboy.com">http://www.gasboy.com</a>

## Reference Documents

### Read Manufacturer's Instructions

Equipment manufacturers must provide instructions for other equipment, such as Submersible Turbine Pumps (STPs), leak detectors, underground tanks, product lines, and shear valves. Gasboy does not provide complete installation instructions for other manufacturer's equipment.

### Read Gasboy Technical Manuals

Document Number	Title	GOLD <sup>SM</sup> Library
FE-356	Atlas Retail/Commercial Dispenser Field Wiring	Field Wiring Diagrams
FE-357	Atlas Pump Retail/Commercial Field Wiring	Field Wiring Diagrams
FE-361	Atlas Master & Satellite Field Wiring Diagram	Field Wiring Diagrams
MDE-4331	Atlas Fuel Systems Installation Manual	Gasboy Atlas Pumps/Dispensers
MDE-4334	Atlas Start-up/Service Manual	Gasboy Atlas Pumps/Dispensers
MDE-4363	Atlas Fuel Systems Owner's Manual	Gasboy Atlas Pumps/Dispensers
PT-1949	Atlas Pump and Dispenser Illustrated Parts Manual	<ul style="list-style-type: none"> <li>• Gasboy Atlas Pumps/Dispensers</li> <li>• Parts Manual</li> </ul>
PT-1950	Gasboy Atlas Recommended Spare Parts	Gasboy Atlas Pumps/Dispensers

### Abbreviations and Acronyms

Term	Description
AC	Alternate Current
ASC	Authorized Service Contractor
CFN	Cash Flow Network
DC	Direct Current
DEF	Diesel Exhaust Fluid
FMS	Fuel Management System
GFI	Ground Fault Interrupter
HDPE	High Density Polyethylene
NCWM	National Conference of Weights and Measures
NEC®	National Electrical Code
NFPA	National Fire Protection Association
NPT	National Pipe Taper
NTEP	National Type Evaluation Program
STP	Submersible Turbine Pump
UL®	Underwriters Laboratories ( <a href="http://www.ul.com">http://www.ul.com</a> )

## Common Terms

Term	Definition
CoC	Certificate of Compliance [see <a href="#">CoC#s</a> on the back of the front cover for listing of numbers].
CSA	Canadian Standards Association ( <a href="http://www.csa.ca/">http://www.csa.ca/</a> ).
DEF	A clear, colorless, non-toxic, non-flammable, non-combustible liquid. It is made up of 32.5% Urea with the balance distilled or de-ionized water. Urea and water are completely miscible and do not separate in storage. Diesel Exhaust Fluid (DEF) is mildly corrosive.
Dispenser	Dispensing device that uses STP in storage tank to move fuel from storage tank to dispenser.
Double-poppet Shear Valve	A double-poppet shear valve shuts off the flow of fuel, from the underground tank and from the dispenser, at the dispenser base (hydraulics area) during vehicle impact or fires.
High Hose	Pumps/dispensers with hoses that connect overhead.
Low Hose	Pumps/dispensers with hoses that connect at hydraulics level.
Master/Satellite	Master dispensers are teamed with satellites for rapid fueling of trucks with saddle tanks. The master unit meters and computes product flow for both units. The satellite is a dispenser without the electronics module.
Pit Box	If used, a rigid, anchored enclosure to be installed in the ground onto which the pump/dispenser is mounted. The pit box is also the point to which plumbing and conduit are routed, and to which the lower portion of the shear valve(s) is connected. "Pit box" is also known as "dispenser sump".
Pump	Uses self-contained pumping unit and motor to move fuel from storage tank.
Single-poppet Shear Valve	A single-poppet shear valve shuts off the flow of fuel, from the underground tank, at the dispenser base (hydraulics area) during vehicle impact or fires.
STP	Submersible Turbine Pump.
UL	Underwriters Laboratories (UL) ( <a href="http://www.ul.com">http://www.ul.com</a> ).
ULC	UL of Canada ( <a href="http://www.ulc.ca/">http://www.ulc.ca/</a> ).
UL-listed	Products that bear the authorized Listing Mark of UL. This is the manufacturer's declaration that the product complies with UL's requirements in accordance with the terms of UL's Listing and Follow-Up Service agreement.
Valves	Mechanical device by which the flow of fuel in bulk may be started, stopped, or regulated by a movable part that opens, shuts, or partially obstructs one or more ports or passageways.

## English-to-Metric Conversion Chart

The following table lists English units used in this document and their metric equivalents.

*Note: In some cases, a temperature is given in degree Celsius (°C). If the temperature in degree Fahrenheit (°F) is required, search down the Metric Equivalent column to locate the required degree Celsius and then read the degree Fahrenheit from the left column.*

<b>English Unit</b>	<b>Metric Equivalent</b>
0.75-inches	1.905 centimeters
1-inch	2.54 centimeters
1-1/2-inches	3.81 centimeters
2-feet	60.96 centimeters
2-inches	5.08 centimeters
2-1/2-inches	6.35 centimeters
3-inches	7.62 centimeters
3-1/2-inches	8.89 centimeters
4-inches	10.16 centimeters
8-feet	2.4384 meters
10-feet	3.048 meters
18-inches	45.72 centimeters
32 °F	0 °C
50-feet	15.24 meters
60-inches	1.524 meters
75-feet	22.86 meters
100-feet	30.48 meters
176 °F	80 °C
200-feet	60.96 meters
1000-feet	304.8 meters
1500-feet	457.2 meters
2600-feet	792.48 meters



## 2 – Important Safety Information

**Notes:** 1) *Save this Important Safety Information section in a readily accessible location.*

2) *Although DEF is non-flammable, Diesel is flammable. Therefore, for DEF cabinets that are attached to Diesel dispensers, follow all the notes in this section that pertain to flammable fuels.*

This section introduces the hazards and safety precautions associated with installing, inspecting, maintaining, or servicing this product. Before performing any task on this product, read this safety information and the applicable sections in this manual, where additional hazards and safety precautions for your task will be found. Fire, explosion, electrical shock, or pressure release could occur and cause death or serious injury, if these safe service procedures are not followed.


### Preliminary Precautions


You are working in a potentially dangerous environment of flammable fuels, vapors, and high voltage or pressures. Only trained or authorized individuals knowledgeable in the related procedures should install, inspect, maintain, or service this equipment.

### Emergency Total Electrical Shut-Off

The first and most important information you must know is how to stop all fuel flow to the pump/dispenser and island. Locate the switch or circuit breakers that shut off all power to all fueling equipment, dispensing devices, and Submerged Turbine Pumps (STPs).

**⚠ WARNING**

 The EMERGENCY STOP, ALL STOP, and PUMP STOP buttons at the cashier's station WILL NOT shut off electrical power to the pump/dispenser. This means that even if you activate these stops, fuel may continue to flow uncontrolled.

 You must use the TOTAL ELECTRICAL SHUT-OFF in the case of an emergency and not the console's ALL STOP and PUMP STOP or similar keys.

### Total Electrical Shut-Off Before Access

Any procedure that requires access to electrical components or the electronics of the dispenser requires total electrical shut off of that unit. Understand the function and location of this switch or circuit breaker before inspecting, installing, maintaining, or servicing Gilbarco equipment.

### Evacuating, Barricading, and Shutting Off

Any procedure that requires access to the pump/dispenser or STPs requires the following actions:



- An evacuation of all unauthorized persons and vehicles from the work area
- Use of safety tape, cones, or barricades at the affected unit(s)
- A total electrical shut-off of the affected unit(s)

### Read the Manual

Read, understand and follow this manual and any other labels or related materials supplied with this equipment. If you do not understand a procedure, call a Gasboy Authorized Service Contractor or call the Gasboy Support Center at 1-800-444-5529. It is imperative to your safety and the safety of others to understand the procedures before beginning work.

### Follow the Regulations

Applicable information is available in National Fire Protection Association (NFPA) 30A; *Code for Motor Fuel Dispensing Facilities and Repair Garages*, NFPA 70; *National Electrical Code (NEC)*, Occupational Safety and Health Administration (OSHA) regulations and federal, state, and local codes. All these regulations must be followed. Failure to install, inspect, maintain, or service this equipment in accordance with these codes, regulations, and standards may lead to legal citations with penalties or affect the safe use and operation of the equipment.

### Replacement Parts

Use only genuine Gilbarco replacement parts and retrofit kits on your pump/dispenser. Using parts other than genuine Gilbarco replacement parts could create a safety hazard and violate local regulations.

### Federal Communications Commission (FCC) Warning

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

### Safety Symbols and Warning Words

This section provides important information about warning symbols and boxes.

#### Alert Symbol



This safety alert symbol is used in this manual and on warning labels to alert you to a precaution which must be followed to prevent potential personal safety hazards. Obey safety directives that follow this symbol to avoid possible injury or death.

#### Signal Words

These signal words used in this manual and on warning labels tell you the seriousness of particular safety hazards. The precautions below must be followed to prevent death, injury, or damage to the equipment:



**DANGER:** Alerts you to a hazard or unsafe practice which will result in death or serious injury.



**WARNING:** Alerts you to a hazard or unsafe practice that could result in death or serious injury.



**CAUTION with Alert symbol:** Designates a hazard or unsafe practice which may result in minor injury.

**CAUTION without Alert symbol:** Designates a hazard or unsafe practice which may result in property or equipment damage.

### Working With Fuels and Electrical Energy Prevent Explosions and Fires

Fuels and their vapors will explode or burn, if ignited. Spilled or leaking fuels cause vapors. Even filling customer tanks will cause potentially dangerous vapors in the vicinity of the dispenser or island.

DEF is non-flammable. Therefore, explosion and fire safety warnings do not apply to DEF lines.

## Important Safety Information

### No Open Fire



Open flames from matches, lighters, welding torches, or other sources can ignite fuels and their vapors.

### No Sparks - No Smoking



Sparks from starting vehicles, starting, or using power tools, burning cigarettes, cigars, or pipes can also ignite fuels and their vapors. Static electricity, including an electrostatic charge on your body, can cause a spark sufficient to ignite fuel vapors. Every time you get out of a vehicle, touch the metal of your vehicle, to discharge any electrostatic charge before you approach the dispenser island.

### Working Alone

It is highly recommended that someone who is capable of rendering first aid be present during servicing. Familiarize yourself with Cardiopulmonary Resuscitation (CPR) methods, if you work with or around high voltages. This information is available from the American Red Cross. Always advise the station personnel about where you will be working, and caution them not to activate power while you are working on the equipment. Use the OSHA Lockout/Tagout procedures. If you are not familiar with this requirement, refer to this information in the service manual and OSHA documentation.

### Working With Electricity Safely

Ensure that you use safe and established practices in working with electrical devices. Poorly wired devices may cause a fire, explosion, or electrical shock. Ensure that grounding connections are properly made. Take care that sealing devices and compounds are in place. Ensure that you do not pinch wires when replacing covers. Follow OSHA Lockout/Tagout requirements. Station employees and service contractors need to understand and comply with this program completely to ensure safety while the equipment is down.

### Hazardous Materials

Some materials present inside electronic enclosures may present a health hazard if not handled correctly. Ensure that you clean hands after handling equipment. Do not place any equipment in the mouth.

#### WARNING

The pump/dispenser contains a chemical known to the State of California to cause cancer.

#### WARNING

The pump/dispenser contains a chemical known to the State of California to cause birth defects or other reproductive harm.



Gilbarco Veeder-Root encourages the recycling of our products. Some products contain electronics, batteries, or other materials that may require special management practices depending on your location. Please refer to your local, state, or country regulations for these requirements.

## In an Emergency

### Inform Emergency Personnel

Compile the following information and inform emergency personnel:

- Location of accident (for example, address, front/back of building, and so on)
- Nature of accident (for example, possible heart attack, run over by car, burns, and so on)
- Age of victim (for example, baby, teenager, middle-age, elderly)
- Whether or not victim has received first aid (for example, stopped bleeding by pressure, and so on)
- Whether or not a victim has vomited (for example, if swallowed or inhaled something, and so on)

#### WARNING



Gasoline/DEF ingested may cause unconsciousness and burns to internal organs. Do not induce vomiting. Keep airway open. Oxygen may be needed at scene. Seek medical advice immediately.

#### WARNING

DEF generates ammonia gas at higher temperatures. When opening enclosed panels, allow the unit to air out to avoid breathing vapors. If respiratory difficulties develop, move victim away from source of exposure and into fresh air. If symptoms persist, seek medical attention.

#### WARNING



Gasoline inhaled may cause unconsciousness and burns to lips, mouth, and lungs. Keep airway open. Seek medical advice immediately.

#### WARNING



Gasoline/DEF spilled in eyes may cause burns to eye tissue. Irrigate eyes with water for approximately 15 minutes. Seek medical advice immediately.

#### WARNING



Gasoline/DEF spilled on skin may cause burns. Wash area thoroughly with clear water. Seek medical advice immediately.

#### WARNING



DEF is mildly corrosive. Avoid contact with eyes, skin, and clothing. Ensure that eyewash stations and safety showers are close to the work location. Seek medical advice/recommended treatment if DEF spills into eyes.

**IMPORTANT:** Oxygen may be needed at scene if gasoline has been ingested or inhaled. Seek medical advice immediately.

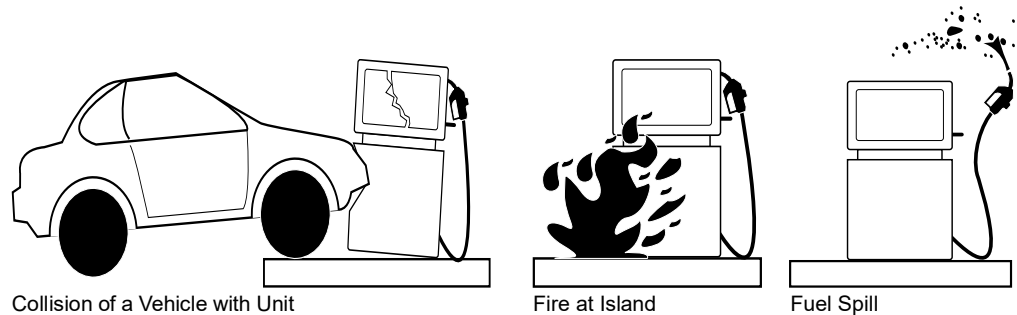
### Lockout/Tagout

Lockout/Tagout covers servicing and maintenance of machines and equipment in which the unexpected energization or start-up of the machine(s) or equipment or release of stored energy could cause injury to employees or personnel. Lockout/Tagout applies to all mechanical, hydraulic, chemical, or other energy, but does not cover electrical hazards. Subpart S of 29 CFR Part 1910 - Electrical Hazards, 29 CFR Part 1910.333 contains specific Lockout/Tagout provision for electrical hazards.

## Hazards and Actions

<span style="font-size: 1.5em; margin-right: 10px;">⚠</span> <b>WARNING</b>	
	<p>Spilled fuels, accidents involving pumps/dispensers, or uncontrolled fuel flow create a serious hazard.</p>
	<p>Fire or explosion may result, causing serious injury or death.            Follow established emergency procedures.            DEF is non-flammable. However it can create a slip hazard. Clean up spills promptly.</p>

The following actions are recommended regarding these hazards:



- Do not go near a fuel spill or allow anyone else in the area.
- Use station EMERGENCY CUTOFF immediately. Turn off all system circuit breakers to the island(s).
- Do not use console E-STOP, ALL STOP, and PUMP STOP to shut off power. These keys do not remove AC power and do not always stop product flow.
- Take precautions to avoid igniting fuel. Do not allow starting of vehicles in the area. Do not allow open flames, smoking or power tools in the area.
- Do not expose yourself to hazardous conditions such as fire, spilled fuel or exposed wiring.
- Call emergency numbers.

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## 3 – Site Preparation

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<b>IMPORTANT INFORMATION</b>
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When preparing the site, use safety tape, cones, or barricades to block the work area.
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### Station Layout

Recommended guidelines for the Station Layout are as follows:

- Consider traffic flow, kiosk, and store location when planning location of pumps/dispensers.
- Plan islands for efficient routing of plumbing and wiring. Arrange product lines by hose and foundation layouts (refer to *MDE-4331 Atlas Fuel Systems Installation Manual*). Follow local codes.

*Note: Actual flow rates will depend on your specific installation and accessories used.*

*Remember pipe size and number of fittings can affect flow rate. Refer to “[Important Considerations for DEF Dispensers](#)” on [page 3-28](#).*

- Place pumps/dispensers such that the customers can dispense fuel safely and conveniently.
- Install pumps/dispensers at least 8 feet apart on island.
- Consider the service person who must have easy access to the entire pump/dispenser (top, rear, front, and sides). Gasboy recommends at least 60 inches of clearance from any structure (for example, wall, fence).
- Install protective posts at ends of island to protect pumps/dispensers against collision. Posts must not interfere with customer fueling.

### Product System Layout

- Distance from tank to pump must not be more than 50 feet.
- Fuel line dimensions, refer to “[Pipe Size](#)” on [page 3-32](#).
- Fuel line minimum burial depth starting at inlet riser to the pumping unit is 18 inches.
- Fuel line piping sloping rate of 1-1/2 to 2 inches per 10 feet of piping run.  
*Note: Traps and sags are not acceptable.*
- Avoid unnecessary elbows and/or turns in piping. Each elbow and turn decreases product flow and if used in excess may cause issues with fuel delivery.
- Maximum lift is 10 feet (refer to “[Fuel Tanks](#)” on [page 3-31](#)).
- Pumps (self contained units) must have a vacuum actuated pressure regulating valve to prevent positive pressure at the pump base when used with aboveground tanks.
- For aboveground tank installations, refer to “[Shear Valves](#)” on [page 3-33](#) and “[Pipe Installation](#)” on [page 3-31](#).

## Station Security

This section includes information that is applicable primarily to Commercial sites and some Retail sites. It may be impossible with any manufacturer's unit even if it is designed for security, to stop a knowledgeable, unobserved experienced thief. It is possible to greatly reduce the probability that a theft will be successful, if security measures are designed into the station layout and security minded actions are planned into site operations.

### Steps to Enhance Security

The following recommendations are intended to decrease the probability of theft by observance and/or incorporating obstacles that deter criminal activity:

- Design stations where employees have full unobstructed view of all fueling locations. Do not block employee views with merchandise displays or other obstructions. If full view is not possible, utilize video surveillance equipment. Monitoring of equipment must be made obvious and signs stating its use must be posted.
- Use pump/dispenser security kits, when available.
- For Fuel management or console models with "time out" programming capabilities, plan to use modular programming "time out" functions that shut down the unit if no pulser activity occurs for a preselected time.
- Plan to provide periodic/frequent inspection of equipment security provisions to verify their integrity.
- For electronic retail units, enter a new programming access code, as default codes are commonly known. These codes must only be known by trusted station employees and the involved ASCs.
- At installation and all times thereafter, ensure that lower door locks are adjusted correctly and will not allow the panels to be removed easily without a key or tool. If you suspect that keys are available to thieves in your area, consider using special locks or keys available from locksmiths.
- Use surveillance cameras especially for high risk locations and locations potentially blocked from view.
- Observe POS warnings or messages for units offline, when available.

# Equipment and Materials Required at Site

## WARNING

Use of incompatible materials or components with alternative fuels such as E85 can result in leaks or unexpected failures of components resulting in fire, explosion, or environmental damage.

When dispensing alternative fuels such as E85, verify with the manufacturer if the material of all plumbing components are compatible with fuels such as E85 being dispensed.

- Fuel storage tanks
- STPs and leak detectors for dispensers
- Piping and fittings
- Pit boxes (also known as dispenser sumps)
- Shear valves for dispensers
- Check valves for pumps
  - GPU M04920B003- Inlet Check Valve Kit M04920K109 (1 per pumping unit)
  - GPU+ M09593A102- Inlet Check Valve Kit M09593K109 (1 per pumping unit)
- Conduit and gas/oil resistant wiring
- STP control relay boxes for dispensers
- Circuit breakers
- Isolation relays for electronic dispensers
- Emergency power cutoff switch
- Safety warning signs
  - Place warning signs (for example, No Smoking, Turn Off Engine) where fuel customers will notice and read them. For warning signs, contact your local distributor.
- Conduit Seal (Potting) Compound (as required by seal manufacturer)
- For aboveground tanks with self-contained pumps, use vacuum-actuated pressure-regulating valve with a shear section at the pump (Gasboy 52 valve)
- Distribution box(es) or service module(s) is required per unit type
- UL-approved sealant suitable for the application involved
- Wiring and conduit materials as outlined in the wiring diagram suitable for the fluid and application involved

## CAUTION

### **Applicable to Dispensers Rated for E85 Use:**

Do not use tape at the very end of the pipe nipple to avoid tape entering the dispenser hydraulics. Tape in the hydraulics can cause failures of valves, nozzles, or other significant problems.

Use only UL-listed TPS PTFE Pipe Sealant manufactured by SAF-T-LOC International Corp.

Use only UL-listed Taega Technologies Inc. Teflon® tape.

*Note: Teflon tape must be used only at the inlet pipe connection.*

## Electrical Requirements

- DEF is non-flammable and creates no explosive vapors. Therefore, installation requirements for DEF units differ from units that handle hazardous fuels. However, electrical safety requirements are applicable. If a DEF unit is installed in the Class 1 Division 2 hazard zone of a pump/dispenser delivering flammable fluids, consult Gasboy Technical Support to determine requirements for installing DEF units in that area. Generally, the unit must be installed to comply with requirements for units handling flammable fluids for the area within the hazard zone.
- Prepare sites according to NFPA 30A, NFPA 70, and applicable national, state, and local codes/regulations.
- Use licensed electricians to make all electrical connections.
- Use a dedicated circuit/phase system. Wire all electronic units to the same power leg.
- Use an earth ground for circuits.
- Mount all circuit breaker panels and relay boxes securely to the wall.
- Use UL recognized/approved components and/or systems.
- Recommended voltages for pumping unit motors are 220VAC- single phase or 380VAC-3 phase.
- Route product wiring to protect from damage using conduit, as required.

*Notes: 1) Pumping units require higher load levels than dispensers. For details, refer to FE-356 Atlas Retail/Commercial Dispenser Field Wiring, FE-357 Atlas Pump Retail/Commercial Field Wiring, and FE-361 Atlas Master & Satellite Field Wiring Diagram.*

*2) Switched Neutral is not allowed in Canada.*

## Emergency Power Cutoff Switch

### **WARNING**

Spills and collisions expose highly flammable and explosive fuels. Failure to install and use an Emergency Power Cutoff could result in severe injury or death. Observe all safety precautions in this and other manuals.

### **IMPORTANT INFORMATION**

Devices such as D-Boxes, Two-wire, and so on must be de-energized or have wiring disconnected from the dispenser by the Emergency Stop or equivalent mechanism. Third-party devices such as those supplying power to any form of communication to a dispenser (intercoms, RS-485 communications, third-party controllers and such) must also be de-energized or the wiring supplying that power be disconnected. Provision to accommodate this must not introduce noise (RFI or electrical) into sensitive pump dispenser electronic field wiring circuits during normal pump/dispenser operation. De-energizing of the external equipment through the Emergency Stop or equivalent device is recommended.

- NFPA 30A and Gasboy require that you install one or more emergency power cutoff switches.
- An emergency power cutoff switch is a single control that removes AC power to all island equipment (pumps/dispensers, STPs, canopies, lights, and so on).



- Make the emergency power cutoff switch accessible, label it clearly, and install it away from any hazard that may occur at the pumps/dispensers. Do not install cutoff switches more than 100 feet away from the pumps/dispensers.
- Show all employees where the emergency power cutoff switch is located and how to use it. Remind them often.

*Notes: 1) Do not use E-STOP, ALL-STOP, or PUMP STOP keys on Gasboy console/cash registers to shut off pump/dispenser power. These keys do not remove AC power and do not always stop product flow.*

*2) Daisy Chain Wiring is used to reduce wiring cost. However, it is not recommended as it results in loss of power to all pumps in the event of one bad wire or bad connection. Wiring shown in this manual is for non-daisy-chain applications.*

## Units with Ground Fault Interrupt (GFI)

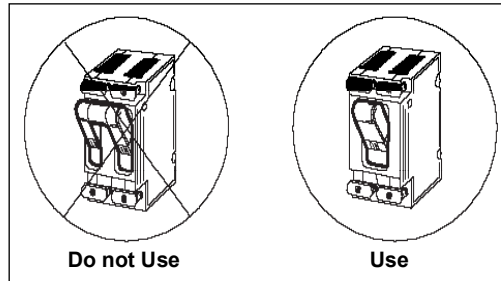
GFI Breakers are required for DEF dispensers mounted on Skid Tanks because of no underground piping, AC power in potentially wet area, and a potential for earth ground to break if Skid Tank moves.

A GFI consists of a sensor that detects changes in the current to the load, by comparing the current flowing **to** the load and the current flowing **from** the load. A drop-off in the current equivalent to about 5 milliamperes turns off all power by tripping a relay within the GFI within a few hundredths of a second.

When powering a dispenser with a GFI, the return neutral of any device to which the dispenser supplies power must be the same neutral as that of the dispenser. For example, the STP control relay.

## Circuit Breakers

Figure 3-1: Circuit Breakers



- Install a dedicated UL/ULC/CSA-listed switched-neutral breaker to each circuit leading to a pump/dispenser or dispenser and STPs. It must be able to disconnect hot and neutral conductors simultaneously. Single-pole breakers with handle ties must not be permitted. Ref. NEC 514.11 (Switched Neutral is not allowed in Canada).
- Use only UL/ULC/CSA-listed circuit breaker panel as appropriate for that area.
- Install circuit breakers away from the pumps/dispensers. They must be readily accessible and clearly marked.
- Install a separate circuit breaker for each STP (dispenser models) or each pump motor (self-contained models).
- Install one circuit breaker for each pump/dispenser or small island group to allow powering down of pump/dispenser for service.

Power to the unit must be supplied from a dedicated breaker.

- No other equipment must be powered from this breaker.
- Remote dispensers may be grouped together on a single breaker when the submersible pump has its own breaker.
- It is recommended that no more than two remote dispensers be powered from one breaker to maintain isolated control with the circuit breaker panel in case of problems.
- Units directly driving pumps (suction or submersible) must be supplied power from a separate breaker. A tag on the motor identifies the maximum current draw of the motor. If two pumps are supplied from one breaker, that breaker must be capable of handling the load of both motors.
- DEF units contain a special heater to prevent the DEF fluid from freezing during very cold weather. Properly size circuit breakers to handle normal pump/dispenser power requirement plus that for the heater.

### CAUTION

In cases where multiple remote dispensers supply power to a single submersible pump, all breakers controlling the remote dispenser must be on the same phase of power. Failure to do this will damage the equipment. Provisions must be made to break both legs of any AC circuit.

## STP Control Relay Boxes for Dispensers

- Install a separate control relay for each STP.
- Do not use the dispenser relay to power the STP.
- Combined STP Control Relay/Isolation Relay boxes are recommended.

## STP Isolation Relays for Electronic Dispensers

STP isolation relays provide electrical isolation between dispensers and prevent damage from cross phasing. For more information, refer to *MDE-4334 Atlas Start-up/Service Manual* and *FE-356 Atlas Retail/Commercial Dispenser Field Wiring*.

*Note: For 3-phase STP, use isolation relay at the input of the 3-phase STP control box.*

- Gasboy requires installation of STP isolation relays in addition to STP control relays.
- Use isolation relays for each STP control line at each dispenser or dispenser grouping on a single circuit breaker.
- Route neutral wire to the control relays from the dispenser circuit breaker. For more information, refer to *FE-356 Atlas Retail/Commercial Dispenser Field Wiring*, *FE-357 Atlas Pump Retail/Commercial Field Wiring*, and *FE-361 Atlas Master & Satellite Field Wiring Diagram*.
- Combined STP Control Relay/Isolation Relay boxes are recommended.

## Conduit

- DEF is non-flammable and creates no explosive vapors. Therefore, installation requirements for DEF units differ from units that handle hazardous fuels. However, electrical safety requirements are applicable. If a DEF unit is installed in the Class 1 Division 2 hazard zone of a pump/dispenser delivering flammable fluids, consult Gasboy Technical Support to determine requirements for installing DEF units in that area. Generally the unit must be installed to comply with requirements for units handling flammable fluids for the area within the hazard zone.
- Use 1-inch trade size rigid aluminum conduit with Gasboy pumps/dispensers to connect wires to the pump/dispenser (Retail).  
Two-wire data wires for retail electronics can share power wiring conduit (refer to model-specific wiring diagrams).  
Four-wire data wires for RS-485 communications can share power wiring conduit (refer to model-specific wiring diagrams).
- Use a threaded, rigid metal conduit or a rigid non-metallic conduit for applications below the pump/dispenser to carry electrical wires. Conduit must conform to national and local electrical codes. If you use a nonmetallic conduit, it must be at least 2-feet underground. The last 2-feet of the underground run to the junction box must be rigid metal conduit or threaded steel intermediate metal conduit. Tighten all threaded conduits.
- Never share conduit or wire troughs with other manufacturers' equipment (for example, speaker wires, canopy lights, and so on). When using RS-485 communications with Atlas Commercial units communicating with Islander PLUS, CFN® PLUS, TopKAT™ PLUS, and PRIME systems, all AC and DC wiring must be in separate conduit. For more details, refer to [“Atlas - Commercial”](#) on [page 3-18](#).  
*Note: You can use the same conduit for routing power to the pump/dispenser and the Two-wire (Retail) data loop (Class 1 circuit). The Two-wire data loop is a Class 1 circuit.*
- Never rely on metal conduit to provide an equipment ground. Run a separate ground wire.
- Never use knock-out boxes or flexible conduit for installation.  
*Note: Extra junction boxes added to the pump/dispenser must be listed Class 1, Div. 1, Group C and D explosion-proof.*
- Use electrical fittings that are listed for Class 1, Group C and D hazardous locations, as required by NFPA 30A and NFPA 70.

- A seal-off ‘Y’ fitting (for example, Killark® Type EY) must be installed on all units as a first connection where conduit leaves the ground.
- If TopKAT PLUS is factory mounted or unit is equipped with Atlas PRIME, a separate conduit must be installed. Refer to the TopKAT PLUS documentation for field wiring or Atlas Installation Manual or Islander PRIME Installation Manual.
  - *MDE-4331 Atlas Fuel Systems Installation Manual*
  - *MDE-5013 TopKAT PLUS Installation Manual*
  - *MDE-5411 ForeHB Islander PRIME Installation Manual*

## Wiring

The distinction between the Commercial and Retail pump/dispenser units is that the Commercial unit must use the separate conduit arrangement to keep the signals from interfering with one another or other noise generating devices, whereas with the Retail unit this is not required.

### Atlas - Commercial

The Atlas Commercial pump/dispenser utilizes two conduits, one for AC power and second for the DC signals (the two conduits must be kept separate to reduce signal interference). The AC conduit carries AC power line and supplies power to the valves and motors, whereas the DC conduit delivers the RS-485 signal when used with a Islander PLUS, CFN PLUS, TopKAT PLUS, and PRIME systems, or Pulse Output when used for mechanical pump interfaces or other manufacturer’s control system.

When installed in a separate DC conduit, 18 American Wire Gauge (AWG) wires are required for installation. Although it is recommended that DC Commercial pump interface wires (RS-485 or Pulse Output) be run in a conduit separate from AC wires, they can be combined in the same conduit with AC wires provided UL-listed cable with the following specifications are used.

Components/Parameters	Specification
Conductor	18 AWG stranded wire. Number of conductors to be determined by pulser requirements (to determine number of wires used, refer to wiring diagram ).
Shield	Foil-wrapped 100% coverage and/or tinned copper braid 90% coverage.
Drain Wire	Stranded, tinned copper, 20 AWG, or larger/or braided shield.
Voltage Rating	Maximum operating voltage of 600 V.
Environmental	Gas and oil-resistant, suitable for wet or dry locations.

Gasboy can supply Belden® 1063A (P/N C09655) which is a UL-listed, four-conductor cable that meets the requirements listed above.

*Note: Belden 1063A is UL-listed but not CSA-listed.*

### Atlas - Retail

The Atlas Retail pump/dispenser utilizes only one main conduit as it does not require a DC conduit. The AC conduit is used to carry AC wire and Two-wire, twisted-pair wiring.

## Wiring Requirements

- Wire all pumps/dispensers according to NFPA 30A, NFPA 70, and applicable national, state, and local codes/regulations.
- Wire all circuits N.E.C. Class 1.
- Use stranded gas and oil resistant copper wire rated for 300 V (up to 240VAC source) and 80 °C.
- In the main conduit of Retail units, for communications, use only twisted-pair, Two-wire data pairs. Do not use shielded twisted-pair wiring.
- Unshielded twisted-pair wire is required per the following:
  - Retail Two-wire communication wiring for new installations.
  - Replacement units, depending on location of the wiring conduit and previous unit style, may require new wiring or adaptive conduit, explosion proof junction box, and jumper wiring to mate with the old wiring.
  - Previously wired stations may continue to use tested existing non-twisted-pair wiring that has been short and continuity tested and passed, where communication problems between the older units and console have not been a problem. Twisted-pair wiring is highly recommended for existing stations experiencing higher than national average lightning strikes or for stations previously experiencing console to dispenser communication problems.
- Leave 3-feet of wire out of conduit for connection to dispenser.
- Place dispensers on the same phase.
 

*Note: If Gasboy isolation relay box is installed, dispensers are not required to be on the same phase.*
- Use listed wire nuts for all connections. Do not use tape.
- Pull spare wires for future use.
- Protect conduit ends and wire from water or damage prior to installation of the pumps/dispensers.
- Seal-off 'Y' fitting(s) must be potted after all wires are run to termination points.

For additional wiring notes and requirements, refer to the following documents:

- FE-356 Atlas Retail/Commercial Dispenser Field Wiring
- FE-357 Atlas Pump Retail/Commercial Field Wiring
- FE-361 Atlas Master & Satellite Field Wiring Diagram

## Retail Data Wire Lengths

Use the following table to determine maximum Retail data wire lengths.

For This Distribution Box	Distance Between the Distribution Box and Dispenser	Distance Between the Distribution Box and Console/Controller
PA0133, PA0187 G-SITE®	"Total" data wire system run no more than 2600 feet with 14 AWG	
PA0242 Transac® System 1000™	No more than 2600 feet with 14 AWG	No more than 2600 feet with 14 AWG
PA0261 Universal D-Box		
PA0306 Distribution Box		

## Commercial Data Wire Lengths

Use the following table to determine maximum Commercial data wire lengths.

For this Distribution Box	Distance Between the Distribution Box and Dispenser	Distance Between the Distribution Box and Console/Controller
RS-485 Cable	Not more than 1000 feet from junction box to farthest Islander PLUS, CFN PLUS, TopKAT PLUS, and PRIME systems component	No more than 1500 feet between all Islander PLUS, CFN PLUS, TopKAT PLUS, and PRIME systems components
LAN Communication	Not more than 280 feet from LAN Hub or controlling device to LAN/jack	

## Grounding

GFI Breakers are required for DEF dispensers mounted on Skid Tanks because of no underground piping, AC power in potentially wet area, and a potential for earth ground to become broken if Skid Tank moves.

A GFI consists of a sensor that detects changes in the current to the load, by comparing the current flowing **to** the load and the current flowing **from** the load. A drop-off in the current equivalent to about 5 milliamperes turns off all power by tripping a relay within the GFI within a few hundredths of a second.

When powering a dispenser with a GFI, the return neutral of any device to which the dispenser supplies power must be the same neutral as that of the dispenser. For example, the STP control relay.

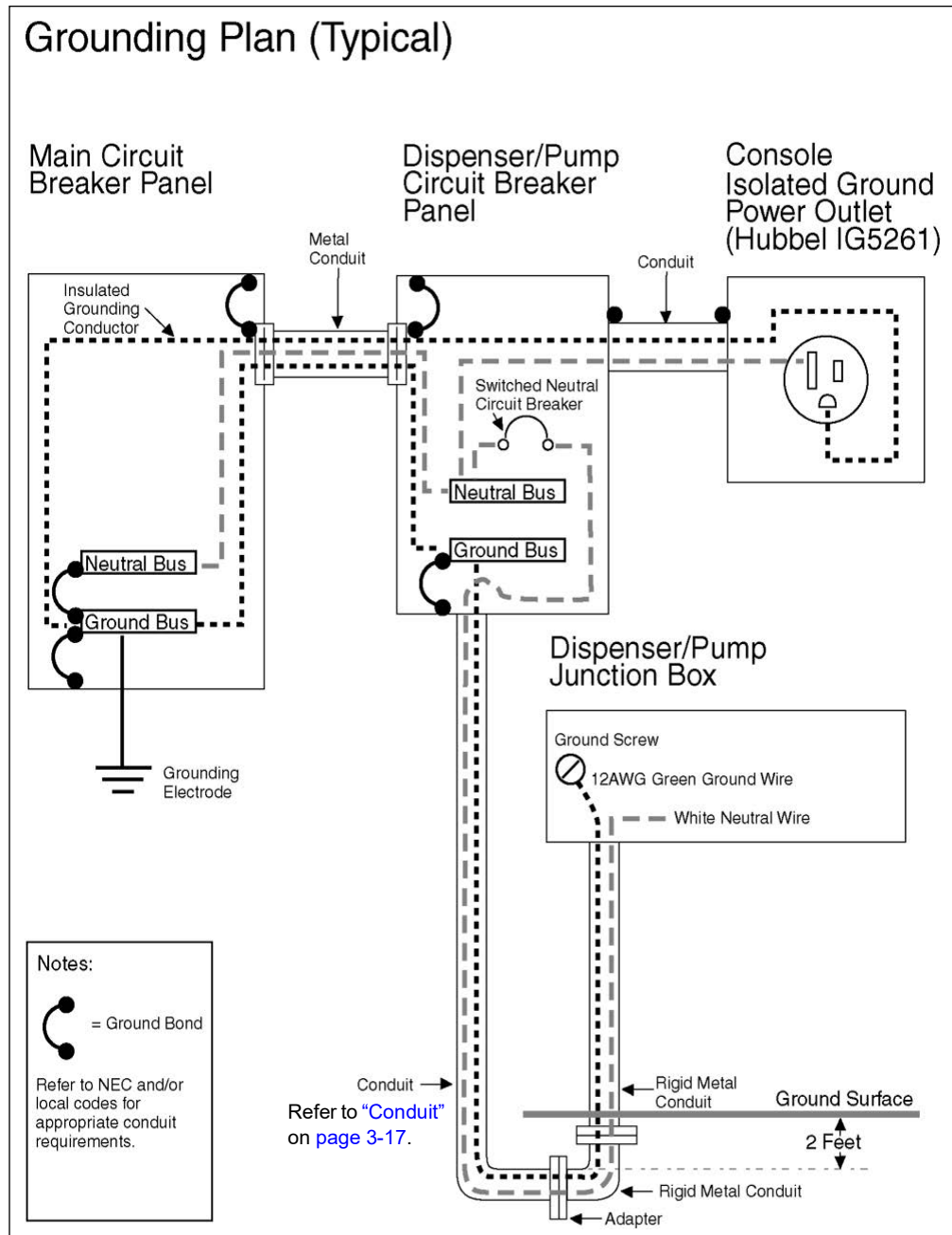
- NFPA 70 requires that you connect the following to system ground:
  - Consoles
  - Pumps and dispensers
  - Submerged turbine pumps
  - Relay control boxes
  - Circuit breaker panel
  - Electronic leak detectors
  - Service module
  - Distribution box
- Gasboy requires that you connect each pump/dispenser to an equipment grounding conductor located in the conduit per NFPA 70, Article 250. The following is applicable to ground conductor:
  - Gasboy recommends using wire no smaller than 12 AWG. A larger wire may be required per NFPA 70, Article 250.
  - Use wire with green, or green and yellow striped insulation.
  - Connect to grounding screw in junction box.
  - Ground the providing power under NFPA 70, Article 250.
  - Bond the neutral bus to an approved grounding electrode.

To ensure proper operation of the equipment and provide the required safety factors, this unit must be grounded per the following:

- A ground wire (preferably green) must be connected between the unit's AC junction box ground lug and the main electrical service panel.
- One earth ground connection is required per unit.
- The ground rod must be a solid, corrosion-resistant conductor, and must be installed at the main electrical panel in accordance with the NEC. It must be properly tied into the ground bus strip of the panel.

- We recommend the neutral and ground bus strips be bonded together (unless prohibited by local codes).

Figure 3-2: Grounding Plan



## Electrical Control Lines

This section provides control input and output information for the Atlas pump/dispensing unit. For electrical wiring information, refer to the following:

- *FE-356 Atlas Retail/Commercial Dispenser Field Wiring*
- *FE-357 Atlas Pump Retail/Commercial Field Wiring*
- *FE-361 Atlas Master & Satellite Field Wiring Diagram*

### Light Feed

The light feed is a 115 VAC (230 VAC International) input required to power the brand panel lights. In a site configuration using multiple remote dispensers (or pumps), the power for the lights of up to eight units can be supplied by one breaker. If separate control of the lights is not required, the light feed for each dispensing unit may be taken from its Reset Motor Feed (mechanical) or Micro Feed (electronic).

### Light Neutral

The light neutral is a return line for AC from the lights to the breaker panel. When a separate breaker is not used to control the lights, the light neutral is attached to the neutral which is connected to the Reset Motor (mechanical) or Micro Neutral (electronic).

### Phase 2 Feed

The phase 2 feed is a hot feed which is the opposite phase of the pump motor feed. This line and pump motor feed are used for domestic 230 VAC motor applications.

### Pulse Out (Commercial Only)

The Pump Interface Boards (Pulse Out and RS-485) supplies a DC output which is provided to indicate the quantity dispensed. Pump Interface Boards are optional and are only used when monitoring of the dispensing unit operation is required as when used with a Fuel Management System (FMS).

*Note: Customers and installers having any questions pertaining to the installation must contact their Gasboy distributor.*



## Wiring Overview

The quality of the electrical installation is a major factor in maintaining proper safety levels and providing trouble-free operation of your Gasboy pump/remote dispenser (refer to [“Electrical Requirements”](#) on [page 3-14](#)). To assure a quality installation, follow these rules:

- 1 All wiring must be installed to conform with all building/fire codes, all Federal, State, and Local codes, NEC, NFPA 70, NFPA 30, and Automotive and Marine Service Station Code (NFPA 30A) codes and regulations. Canadian users must also comply with the Canadian Electrical Code.
- 2 Use only threaded, rigid, metal conduit. For more details, refer to [“Conduit”](#) on [page 3-17](#).
- 3 Use only UL-labeled, insulated, gasoline and oil-resistant stranded copper wiring of the proper size (refer to [“Atlas - Commercial”](#) on [page 3-18](#)).
- 4 Wire connections must be tightly spliced and secured with a wire-nut. Close off the open end of the wire nut with electrical tape.
- 5 The line to the motor must be on a separate circuit and installed on a 20 to 30 A breaker depending on the motor size and/or the voltage setting (refer to [“Circuit Breakers”](#) on [page 3-16](#)).
- 6 Install an emergency power cutoff (refer to [“Emergency Power Cutoff Switch”](#) on [page 3-14](#)). In addition to circuit breaker requirements of NFPA 70 and NFPA 30A, a single control that simultaneously removes AC power from all site dispensing equipment is recommended. This control must be readily accessible from all fueling positions, clearly labeled, and in accordance with all local codes.

In a FMS application, the EMERGENCY STOP and STOP keys on the console and/or the optional EMERGENCY STOP button on the Island Card Reader do not remove AC power from equipment, and under certain conditions, will not stop product flow.

- 7 To provide the highest level of safety to you, your employees, and customers, all employees must be trained as per the location and procedure for turning off power to the entire system.

### **WARNING**

To reduce the risk of electrical shock when servicing, turn off all power to the pump/remote dispenser. In submersible pump applications, turn off power to the submersible pump and any other remote dispensers which use that submersible pump. AC power can feed back into a shutoff dispenser when dispensers share a common submersible pump or starter relay.

- 8 The distinction between the Commercial and Retail pump/dispenser units is that the Commercial unit must use the separate conduit arrangement to keep the signals from interfering with one another or other noise generating devices, whereas with the Retail unit this is not required.
- 9 Ensure that the pump/remote dispenser is installed by a competent installer/electrician.

## Pump Motors

Pumps are shipped from the factory with motors wired according to the specifications given on the order as to kind of current, frequency, and voltage.

Very often on installation, it becomes necessary to change the original setting to suit the AC power source. To do this, locate the motor change-over plate, typically located on the shaft end of the motor and remove the screw which secures it in place. Slide the plate so that the required voltage as marked on the plate, lines up with the screw hole. Reinsert the screw and secure the plate in place.

Many motor failures result from improper setting of the motor change-over plate. If set for 115 VAC and 230 VAC feed is used, the motor will burn out after running only a short time. If set for 230 VAC and 115 VAC feed is used, the motor will run very slowly and the starting field will soon burn out.

### Motor Loads

The following table shows the maximum running amperage that can be expected for the pump motor, unless noted otherwise.

Model	Motor Rating			
	115 V 50/60 HZ 1 PH	230 V 50/60 HZ 1 PH	230 V 50/60 HZ 3 PH	380 V 50/60 HZ 3 PH
9823K, 9152K, 9152KTW1, 9152KTW2	13 A	6.5 A	3.4 A	2.3 A
9852K, 9852KTW1, 9852KTW2 8152K, 8152KTW1, 8152KTW2 8852K, 8852KTW1, 8852KTW2 9153K, 9153KTW2 9853K, 9853KTW2 8153K, 8153KTW2 8853K, 8853KTW2				
9140K 9840K	13.0 A per motor	6.5 A per motor	3.4 A per motor	2.3 A per motor
9850K	N/A	10.0 A	N/A	N/A
9872KX, 9872KXTW1	N/A	N/A	N/A	N/A

Notes: 1) Inadequate feed wiring (too long or too small a diameter wire) will increase current draws on the motor and/or reduce voltage at the motor. This may also reduce motor life.

2) These numbers do not account for the higher load upon start-up, nor up to one additional Amp associated with other electrical components (lights, solenoid valves, and so on).

3) All model numbers ending in TWIM or TW2 have one pump motor per side. 9140K and 9840K also have one pump motor per side.

4) The 9140K and 9840K models must use no less than a 20 A breaker to account for the high current upon startup.

## Heater Load Table

### Load Table Reference Locations - DEF Dispensers (Cold Weather Units Only)

A separate breaker is required for the heater (8.5 A @ 120 VAC 60 Hz). For more information, refer to *FE-356 Atlas Retail/Commercial Dispenser Field Wiring*.

*Note: Heaters are thermostatically controlled and will cycle between on and off during cold weather to maintain a minimum cabinet temperature.*

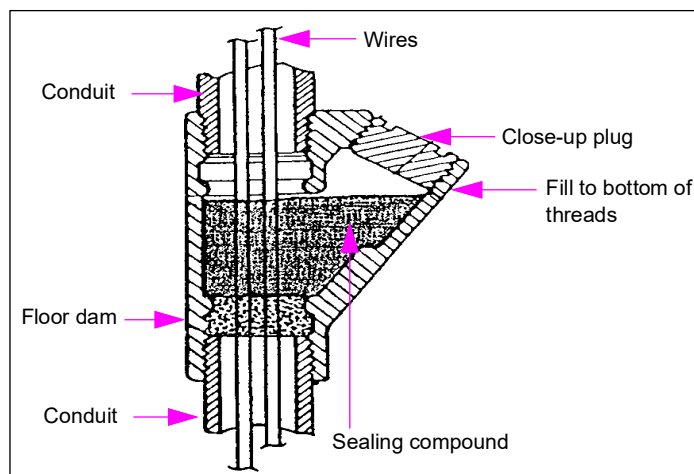
## Sealing 'Y' Fittings

'Y' seals are installed in conduit runs to minimize passage of vapors, gases, or flames from one portion of the electrical installation to another through the conduit. Fittings must be installed in accordance with Articles 501-5 and 502-5 of the National Electric Code and fitting manufacturers' instructions.

DEF is non-flammable and creates no explosive vapors. Therefore, installation requirements for DEF units differ from units that handle hazardous fuels. However, electrical safety requirements are applicable. If a DEF unit is installed in the Class 1 Division 2 hazard zone of a pump/dispenser delivering flammable fluids, consult Gasboy Technical Support to determine requirements for installing DEF units in that area. Generally the unit must be installed to comply with requirements for units handling flammable fluids for the area within the hazard zone.

Gasboy uses Killark Type EY fittings and recommends them or their equivalent for vertical conduit runs. The following sealing directions are for Killark fittings only and instructions may vary for other manufacturer's fittings. Read through all instructions completely before beginning.

**Figure 3-3: Sealing 'Y' Fittings**



- 1 Remove the close-up plug.
- 2 Separate conductors and fill conduit in and around conductors using Killark type “PF” packing fiber to make a floor dam to hold fluid sealing compound.  
*Note: Floor dam must be even with the conduit stop in the lower hub of fitting. Exercise care so as not to damage conductor insulation. Force packing between conductors and hubs, pushing any shreds of packing fiber away from conductors to prevent leakage path.*
- 3 Use only Killark Type “SC” sealing compound with Killark fittings and do the following:
  - Use a clean mixing vessel for every batch of sealant.
  - Mix compound at the rate of 3 parts compound to 1 part water by volume.
  - Sprinkle compound in water while stirring until thick paste is formed.  
*Note: Do not mix more compound than can be used in 15 minutes.*
  - Continue mixing for at least 3 minutes, until consistency is just fluid enough to pour slowly, like thick gravy (not watery).
- 4 Slowly pour approved fluid compound into sealing fitting to level of bottom of threads for close-up plug.  
*Note: Pour slowly to avoid trapping air bubbles in seal.*
- 5 Immediately wipe off any spilled compound and close seal with the close-up plug.  
*Note: Initial setting of sealing compound will occur within 30 minutes. Compound requires a minimum of eight hours above 32 °F to develop sufficient strength to withstand explosion pressures.*

# Plumbing Requirements

## WARNING

Highly flammable and explosive fuels are present. Failure to observe all safety precautions could result in severe injury or death. Observe all safety precautions in this and other manuals.

## Connecting the Pump/Dispenser Inlet Pipes

### WARNING

DEF, flexible fuels such as Biodiesel, high alcohol percentage fuels, and so on, may be incompatible with certain plumbing materials and hydraulic components.

Use recommended sealant, Loctite® #567 (Part Number 56747) and Loctite Primer-N 7649 (Part Number 21347) for DEF pipe threads. **Do not use thread tape.**

Use only UL-listed TPS PTFE Pipe Sealant manufactured by SAF-T\_LOC International Corp. for E85 pipe connections.

Use of incompatible materials or components with alternative fuels such as E85 or DEF can result in leaks or unexpected failures of components resulting in fire or explosion or environmental damage.

When dispensing alternative fuels such as E85 or DEF, verify with the manufacturer of the material or component that all plumbing components are compatible with the fuels or DEF being dispensed. Do not replace the dispenser or pump parts with those incompatible with the fuel or DEF involved.

### WARNING

The Shear Valves must be installed correctly.

Improperly or insufficiently anchored Shear Valves can lead to fire or explosion that could result in severe injury or death.

Anchor all the Shear Valves as per the manufacturer's instructions.

## Important Considerations for DEF Dispensers

### CAUTION

Applicable during Installation and Operation of the Dispenser: DEF freezes at approximately 11 °F (-11.5 °C). Power to the dispenser and heater must always remain ON in cold weather. If power is lost and the temperature drops below this point, the system must be inspected for freeze damage before restart. For sites that experience occasional power losses or for sites that are located in very cold climates, it is recommended that a backup power generator be used to maintain constant power to the dispenser. Do not use any additives to lower the freezing point of DEF. Additives of any type must not be used in DEF.

Prolonged storage at temperatures above 77 °F (25 °C) can impair the quality of DEF and reduce its shelf life.

### CAUTION

DEF is mildly corrosive. It can corrode components that are made from incompatible material(s) and reduce their integrity. The use of incompatible material(s) may lead to leaks and spills, and can contaminate and degrade the DEF. When dispensing DEF, verify with the manufacturer if the material of all plumbing components are compatible with the DEF being dispensed.

### CAUTION

Do not use Prover Cans meant for engine fuel with DEF or vice versa. Use stainless steel Prover Cans for DEF. DEF and engine fuel must not be mixed with each other or be contaminated by each other. Else, damage to a vehicle's engine or pollution control devices could occur. DEF crystallizes as its water base evaporates. Pouring out liquid will not guarantee that no corrosive DEF remains in the Prover Can. DEF must not be contaminated with Diesel fuel, contaminants, or other fluids or materials. Such contamination can cause serious damage to vehicle catalytic converters.

- Conventional fluid handling precautions are also applicable to DEF.
- Avoid contact with eyes, skin, and clothing. Ensure that eyewash stations and safety showers are close to the work location.
- DEF is mildly corrosive and non-flammable.
- Clean the DEF spill with water and dry the area with clean rags, especially areas that contain metallic parts. Spilt DEF can be slippery and will corrode certain types of metallic parts. Wear eye protection and rubber gloves during any cleanup activity.

## Important Considerations when Changing Fuel Types

### WARNING

Certain special alternative fuels such as E85 and additives can degrade pump/dispenser performance or integrity if the dispensers are not designed for use with such fuels. Additionally, converting to certain standard fuels (gasoline, diesel, kerosene, and so on) from alternative fuels such as those with ethanol (E85), methanol, or Biodiesel or from alternative fuels to standard fuels can degrade dispenser performance or integrity. Similar effects can also occur when converting units to different standard fuel types. **As per UL 87A requirements, nozzles dispensing E85 fuel must not be used to dispense any other type of fuel such as Gasoline.**

Leaks and potential environmental hazards can result or components may fail prematurely.

To avoid these issues, follow the guidelines in this section.

Follow the guidelines given below when changing fuel types for a pump/dispenser or using alternative fuels or fluids.

- Verify with your Gilbarco ASC or Distributor if the fuel which you will be using is compatible with the pumps/dispensers to be dispensing the fuel.
- For flexible fuel dispensers, do not use standard hydraulic parts used in other Gilbarco pumps/dispensers for service parts in these units. Standard dispenser parts may not be compatible with fluids.
- Biodiesel fuels must be of ASTM standards for Biodiesel fuels. Mixes of diesel with cooking oils, other plant or animal derived oils, and so on are not considered Biodiesel. Use of such mixes may void warranty on the hydraulic components of the unit.
- Review the latest copy of the unit's warranty statement regarding the use of fuel.
- Certain fuels (especially fuels enhanced with alcohol) when first used in tanks previously containing a different fuel may clean out the tanks and force a large amount of contaminant into the dispenser. Other than abnormally clogging filters, this large quantity of contaminant may damage certain dispenser components. Do not run units without filters at such times. It is normally required that tanks and lines be cleaned of all water, sediment, and contaminant prior to such conversions to minimize potential pump/dispenser downtime or damage. Damage to hydraulic components from contamination when not using filters is not covered by Warranty. Consult your ASC or Gilbarco Distributor for recommendations.
- Do not use any equipment that was formerly used to store or dispense any other fuel or liquid with DEF. Dispensers designed for use with DEF must only be used with DEF.
- Do not use Prover Cans meant for engine fuel with DEF or vice versa.
- Although conversions from one fuel to an equivalent fuel (for example, from another supplier) generally do not create issues, it is recommended that after making any fuel type conversions (refer to the above warning), all units be visually inspected for leaks two days, one week, and one month after fuel conversion. Have your ASC repair any leaks found. This must also be performed for standard fuels when significant new additives are incorporated.

### IMPORTANT INFORMATION

The above guideline does not apply to Flexible fuel model dispensers.

- Whenever non-equivalent fuel conversions are performed, it is recommended that all units be checked for calibration within one month of fuel conversion.
- Some non-equivalent fuel conversions will necessitate the requirement to change the pump/dispenser filter type previously used. Consult your ASC or Gilbarco Distributor for any changes required.
- In Flexible fuel dispensers, Gilbarco recommends the use of 10 micron filters for gasoline-based flexible fuels. Although the use of finer filtration is allowable, filters will tend to clog prematurely, causing excessive filter maintenance cost.
- Use only meters and registration devices for DEF that have a National Type Evaluation Program (NTEP) Certificate of Compliance issued by the National Conference on Weights and Measures (NCWM).
- Non-metallic piping and components used in aboveground DEF service must have high melting points and adequate strength and durability. Some plastic compounds that are suitable for DEF may not be compatible with petroleum products. They must be avoided at locations where they could come in contact with petroleum from a routine operation or a spill.
- An anti-siphon valve must be installed on Aboveground Storage Tanks where the DEF level can be at a higher elevation than the supply piping or the dispenser. The valve will prevent a potential leak in the piping from creating a siphon that could cause a product release.

## DEF Plumbing

### CAUTION

DEF freezes at approximately 11.3 °F. Model variations of DEF units exist with and without internal heaters. Ensure you do not use a unit without a heater if the site may experience temperatures 12 °F or lower. If the unit freezes severe damage may occur to hydraulic components. Such damage is not covered by warranty.

External exposed plumbing must be heated and insulated for sites that may experience temperatures of 12 °F or lower. Thermostatic control is recommended. Heating must be turned on at a higher temperature than 12 °F to ensure no localized section of the pipe experiences a temperature lower than 12 °F. Power to the heaters must never be disabled during very cold weather.

Insulation used on piping for areas that may experience hot as well as very cold temperatures must be shielded from direct sunlight or coated/painted with reflective or white color. DEF can become very hot if dark or black insulation is heated by sunlight during hot weather.

Overhead plumbing sometimes used with DEF installations presents special difficulties (inability to purge air out of the lines, calibration issues, and so on) if not installed properly. An automatic or manual bleed system must be installed at the high point of the plumbing to facilitate air removal during installation or operation. For recommendations, consult Gasboy Technical Support.



## Fuel Tanks

Follow tank manufacturer instructions, national, state, and local regulations for storage tank installation.

On pumps (self-contained units), it is recommended that a vertical lift of 10-feet must not be exceeded. The EPA and API regulates the vapor pressure of gasoline. A lift greater than 10 feet may result in vapor suction rather than gasoline suction.

*Notes: 1) The maximum lift is defined as the vertical distance from the bottom of the suction pipe in the storage tank to the pump shaft centerline of the pumping device.  
2) Install vacuum actuated valve with shear section (per NFPA 30A) directly beneath a self-contained pump when aboveground storage tanks are used. Without vacuum actuated valve, sump may overflow. For more information, refer to manufacturer's installation instructions, Gasboy Product Service Bulletin 26-91, and "Check Valves" on page 3-33.*

Tanks that contain DEF can be aboveground or underground depending on the ambient temperature of the geographical area in which the tanks are located. It is not recommended to use aboveground tanks that contain DEF where temperatures may reach lows of 10 °F.

## Leak Detectors

Use only listed leak detectors. Follow manufacturer instructions for leak detector installation.

## STPs

Use only listed STPs. Follow manufacturer instructions for installation of STPs.

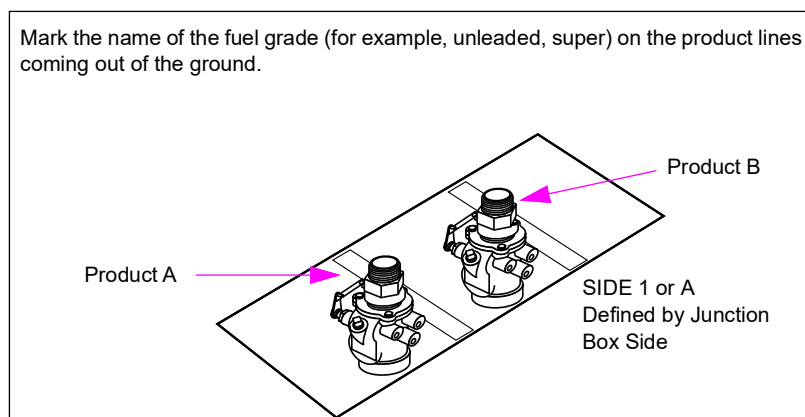
## Pipe Installation

**⚠ WARNING**

Use of incompatible materials or components with alternative fuels such as E85 can result in leaks or unexpected failures of components resulting in fire or explosion or environmental damage.

When dispensing alternative fuels such as E85, verify with the manufacturer if the material of all plumbing components are compatible with fuels such as E85 being dispensed.

**Figure 3-4: Pipe Installation**



For Installation of Aboveground Storage Systems for Motor Vehicle Fueling, refer to PEI Publication RP100 Recommended Practices for Installation of Underground Liquid Storage Systems (Chapter 9) and PEI Publication RP200 Recommended Practices. Refer to model-specific footprint before installing pipes.

- Check national, state, and local regulations for installation of pipe system.
- Use containment system as required by national, state, and local regulations.
- Below the unit, use new black iron pipe. Non-metallic UL and code approved flexible pipe is also acceptable, constructed of UL-approved pipe material and UL-approved fittings. Use of galvanized pipe is acceptable as an alternative to black iron pipe, when black iron pipe is specified.
- Use 1-1/2-inch pipe for riser-to-pump or dispenser.
- Use 2-inch pipe for riser to pump or dispenser for Super-Hi™ and Ultra-Hi™ models.

*Notes: 1) When pipes are shared by different pumping units, special installation considerations are required to prevent one unit from draining the other during fueling.*

*2) A dedicated line is recommended to supply each self-contained pump.*

### IMPORTANT INFORMATION

Since DEF is very susceptible to contamination, ensure that all piping is clean before and during installation.

### Pipe Size

The required pipe size depends on the number of units sharing lines, size of the STPs (dispensers only), and length of the run. Use the following guidelines.

*Note: At locations dispensing Urea, the product line from the tank to the dispenser must not be exposed to sunlight unless a reflective material is used on the piping.*

### Piping and Plumbing Components

Piping and Plumbing Components must be compatible with DEF. Typical piping used is either stainless steel or High Density Polyethylene (HDPE). In environments where temperatures drop below 15 °F, external components must be insulated and heated as required to prevent freezing. Thermostatic control of the heater circuit is recommended where heating commences above 15 °F.

#### Pumps (Standard Flow)

Use new 2-inch, 2-1/2-inch, or 3-inch pipe. Use 2-inch pipe for runs up to 50-feet to a single pump. Increase to 2-1/2-inch or 3-inch pipe for longer runs up to 75-feet to a single pump with maximum lift condition. A dedicated line is recommended to supply each self-contained pump.

#### Pumps (High Flow, Super-Hi, Ultra-Hi)

Use new 3-inch, 3-1/2-inch, or 4-inch pipe. Use 3-inch pipe for runs up to 50-feet to a single pump. Increase to 3-1/2-inch or 4-inch pipe for longer runs up to 75-feet to a single pump with maximum lift condition. A dedicated line is recommended to supply each self-contained pump.

### Dispensers (Standard Flow)

Use new 2-inch, 2-1/2-inch, or 3-inch pipe. If the distance from the STP to the farthest dispenser is 200 feet or less, use 2-inch pipe. If the distance exceeds 200 feet, use 2-1/2-inch or 3-inch pipe to the first dispenser, and 2-inch pipe the rest of the way. Trunk lines supplying multiple dispensers must be larger and must be sized to provide low pressure drop for anticipated flow rate.

### Dispensers (High Flow, Super-Hi, Ultra-Hi)

Use new 3-inch, 3-1/2-inch, or 4-inch pipe. If the distance from the STP to the farthest dispenser is 200 feet or less, use 3-inch pipe. If distance exceeds 200 feet, use 3-1/2-inch or 4-inch pipe to the first dispenser, and 3-inch pipe the rest of the way. Trunk lines supplying multiple dispensers must be larger and must be sized to provide low pressure drop for anticipated flow rate.

### Sharing Product Inlet Pipes (Pumps)

To avoid problems with low flow rate, noise, and so on, always size any common pipe to multiple pumping units so that the maximum flow velocity within the shared pipe never exceeds the fluid velocity in any of the branches with all pumping units running a maximum flow output. Check valves (without springs) are required at each pumping unit inlet to avoid one pumping unit from draining the other during fueling, which could result in loss of prime, flow hesitation, and so on.

## Check Valves

### (Used on Pumps Only)

For information on installing check valves, refer to PEI publication RP100 and manufacturer's installation instructions. Install the check valve as close as practical to the suction unit. It must be gravity activated with minimal or no spring load. Check valves for use internal to the pumping unit are available from Gasboy as an order entry item.

Ensure that there is only one check valve in each dedicated line (preferred method). Use of multiple check valves can restrict flow and cause cavitation, resulting in significant flow rate reductions. If installation requires placing more than one unit on a single dedicated product line, then check valves must be placed at each pump. Check valves must be accessible for service.

## Shear Valves

### **WARNING**

Dispensers that are knocked off of the island expose fuel. Explosion and fire could result in severe injury or death. Installation of shear valve is required by NFPA 30A. Install shear valve properly per manufacturer's instructions.

### (Generally Used on Dispensers Only)

*Note: Shear valves are not required on pumps. However, installation of shear valve is discretionary and sometimes required. Consult local codes.*

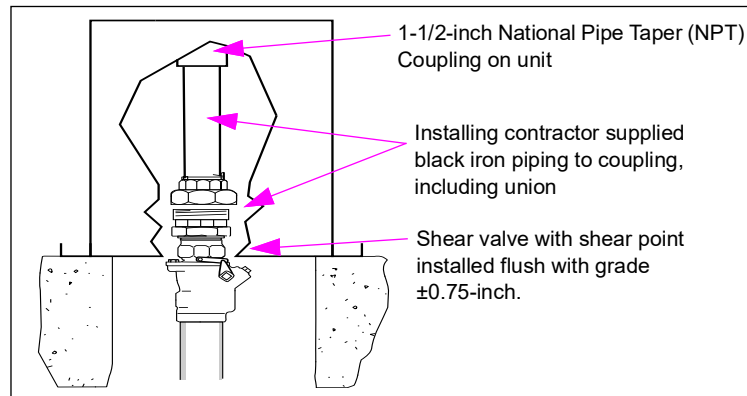
Refer to PEI Publication RP100 Recommended Practices for Installation of Underground Liquid Storage Systems (Chapter 9) and PEI Publication RP200 Recommended Practices for Installation of Aboveground Storage Systems For Motor Vehicle Fueling.

A shear valve is a NFPA 30A required safety device. It closes automatically to stop product flow during a fire or if the dispenser gets knocked off the island. It also provides a means of manually closing inlet pipes.

## IMPORTANT INFORMATION

For the 9862 DEF dispenser, you must use the specified shear valve that is rated for DEF (see [Figure 3-8](#) on [page 3-36](#)).

**Figure 3-5: Shear Valve**



Follow shear valve manufacturer's instructions for installation procedures, testing, and other procedures.

- Install shear valve on each product inlet pipe.

*Note: Gasboy strongly recommends using double-poppet shear valves that shut off flow from the tank and the dispenser (for example, OPW® #10BHMP, or Exxon® - OPW #10RMSP).*

- Also, install a shear valve on master dispenser satellite outlet and at satellite inlet.
- Do not mount the shear valve upside down.
- Ensure that the valve linkage is accessible and has no interference to opening or closing from other piping, structure, or components.
- Do not anchor shear valves at this time. For anchoring procedures, refer to *MDE-4331 Atlas Fuel Systems Installation Manual*.

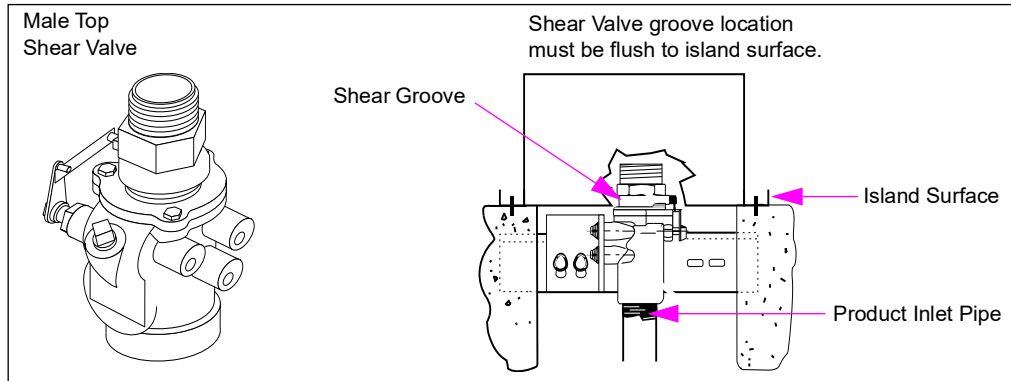
*Note: The dispenser product inlet pipes must be aligned with the shear valve. Do not restrict shear valve linkage with pipes, braces, and so on.*

- Test shear valve operation.
- Close shear valve until equipment startup. Cap outlet pipe. This prevents dirt and other particles from getting in the dispenser product line. It also prevents fuel spillage.
- Install a vapor return line where required. This can be done in two ways:  
Install a flexible connector or shear section on vapor return pipes as required by NFPA 30A to ensure that the product side shear valves will operate correctly. Use 1-inch pipe to connect vapor return pipes located inside pump/dispenser.

~ OR ~

Install 1-inch shear valve listed for use with vapor recovery lines. For Vapor Recovery (Return) Lines, refer to *MDE-4331 Atlas Fuel Systems Installation Manual*.

**Figure 3-6: Installing Vapor Return Line**



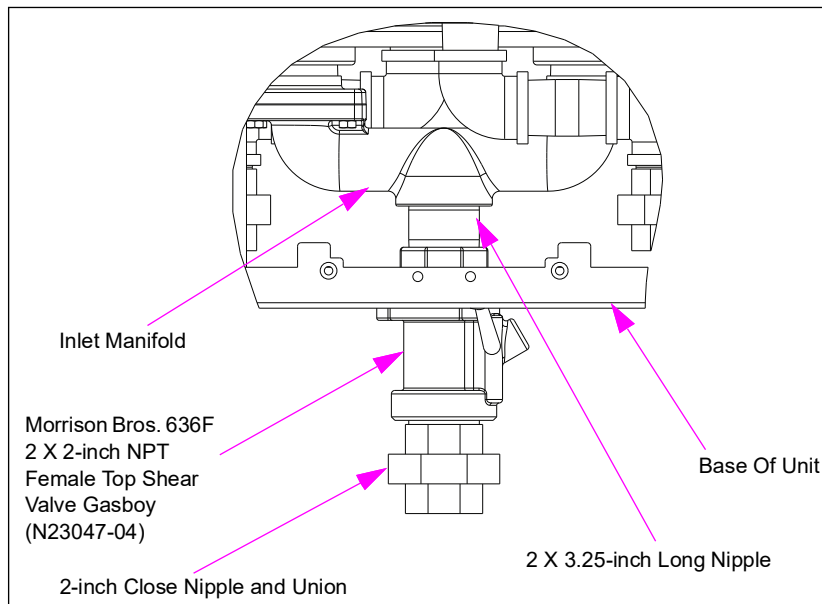
### Model 9850KXTW1 Shear Value Configuration

The Atlas Ultra-Hi with Twin Inlet Manifold requires a special inlet configuration because of the limited base to manifold distance. Gasboy recommends the Morrison Bros. 2-inch 636 F shear valve with a union attached at the bottom of the valve, to connect to the service system piping (see [Figure 3-7](#)).

*Note: This configuration is for the Atlas Model 9850KXTW1 only. All other Atlas models must use a standard inlet configuration.*

All shear valve anchoring requirements noted in this section apply.

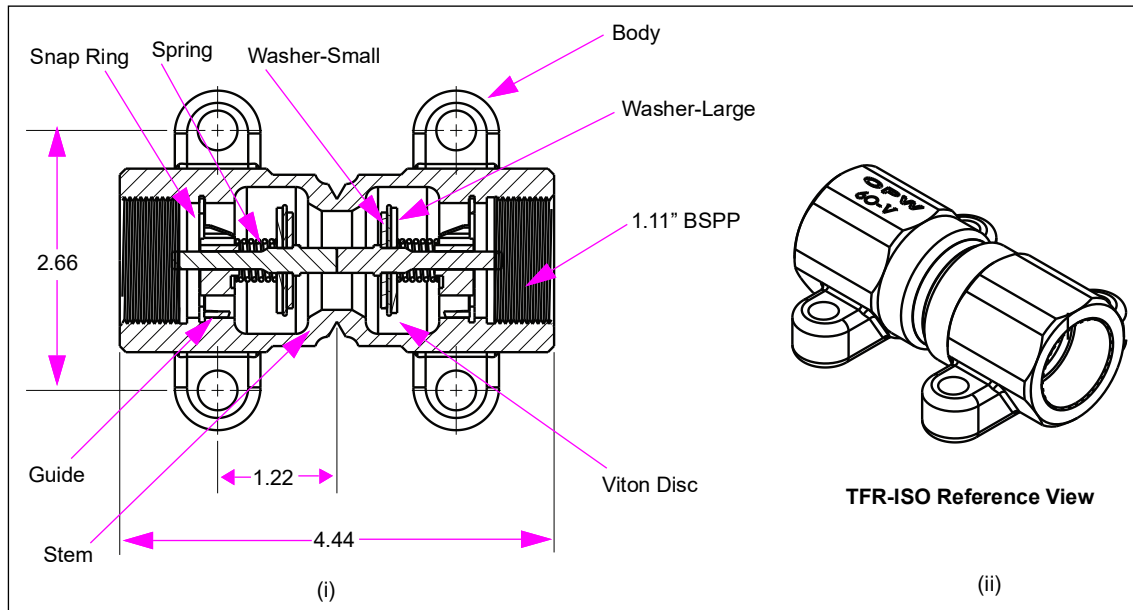
**Figure 3-7: Atlas 9850KXTW1 Model Recommended Inlet Configuration**



## OPW Shear Valve for 9862KXTW1 DEF Unit

*Note: For more information on configuring the shear valve, refer to the manufacturer's recommendations.*

**Figure 3-8: OPW Shear Valve for 9862KXTW1 DEF Unit**



## Pit Box Mounting

- Use strongly designed pit boxes that will not twist, bend, or dislocate the shear valve during a collision.
- Use a pit box that will allow proper access to components during service, does not expose the pit after unit mounting, and properly fastens and supports the unit.
- Anchor pit boxes per pit box manufacturer's recommendations. Use recommended fasteners and tighten to manufacturer's instructions.
- Pit boxes with rain lips are recommended. Otherwise, sealing at the base of the unit may be required.
- The 9862 DEF unit requires four mounting points, one in each corner.

## Safety Signs

- Safety signs warning of potential hazards may be required depending on state and local codes, and NFPA regulations.
- Gasboy requires installing applicable signs in locations likely to be noticed and read by users of the equipment.
- Signs must be easily read, bilingual, durable, and fade resistant. Unless local regulations dictate otherwise, nationally recognized safety symbols with brief text are recommended.
- Signs must include, but are not limited to the following:
  - Use approved containers
  - Turn vehicles off during fueling
  - Static electricity hazards during fueling
  - Health-related warnings (involving fuels), advisement of fuel flammability/explosiveness, and others, as required or desirable
  - No smoking/match warnings
  - Emergency procedures

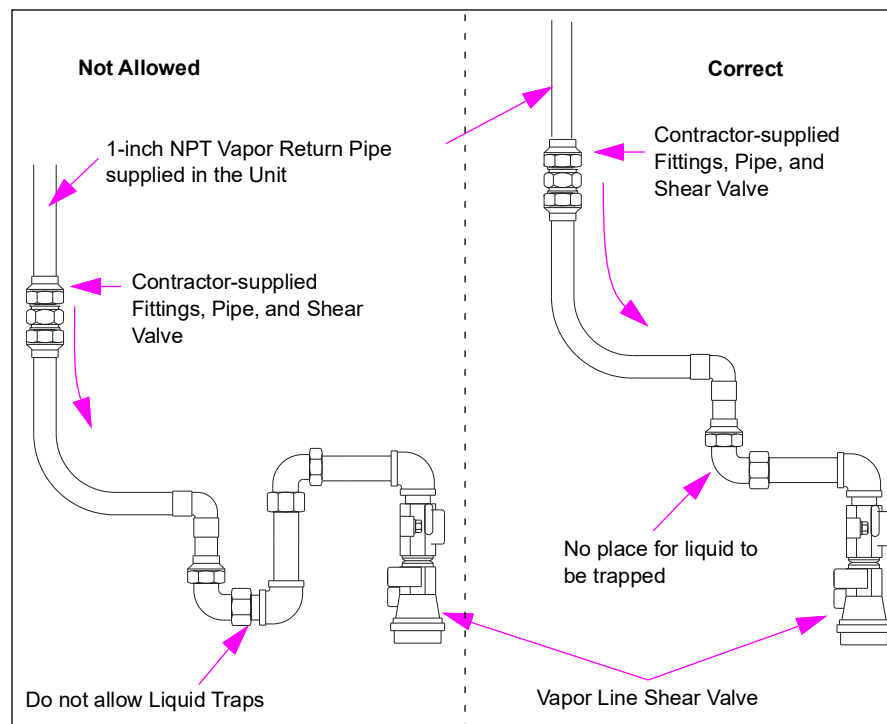
## Connecting the Vapor Return Line to the Vapor Shear Valve

Do not create any liquid traps when connecting the vapor return line to the vapor line Shear Valve (see [Figure 3-9](#) on [page 3-37](#)). A liquid trap is a low spot in the vapor return line that can accumulate fuel and cause blockage, which could cause a system to fail vapor recovery certification tests or create operation issues with vapor balance nozzles.

*Notes: 1) The contractor must provide and install the pipe union for connecting to the 1-inch NPT coupling in the unit.*

*2) Follow the vapor Shear Valve's manufacturer information regarding mounting of the Shear Valve to the unit.*

**Figure 3-9: Correct Vapor Line Connection Method**



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