

DIRECT FIRED LP VAPORIZER

DATA SHEET



SHIELD OF HEAT



DRAGON SHIELD FEATURES

- ▶ Protective coating on anticorrosive cabinet
- ▶ Chimney with wind trap, for extreme climates
- ▶ ASME certified heat exchanger
- ▶ Auto ignition system, which guarantees autonomy
- ▶ Thermal box to protect the electronic ignition system from extreme weather
- ▶ Does not require electricity
- ▶ Protective insulation on cabinet floor and walls
- ▶ The most advanced, reliable and safest systems for the operation of your business
- ▶ Burner with cadminized coating to prevent corrosion

INTRODUCTION

Before installation and operation of the equipment, please become fully familiar with the information laid out in this manual.

The installation, maintenance and operational procedures indicated in this manual will help achieve the safe installation and operation of Dragon Shield Vaporizers.

All LP Gas installations must be validated and approved by competent verification units. Failure to comply with installation regulations will render the guarantee void.

Dragon Shield direct fired vaporizers are used when the gas vapor demand generated by operation exceeds the LP Gas storage tank's natural vaporization capacity.

The vaporizer's function is to transform the gas liquid phase into vapor phase, due to the rise in temperature provided by the vaporizer.

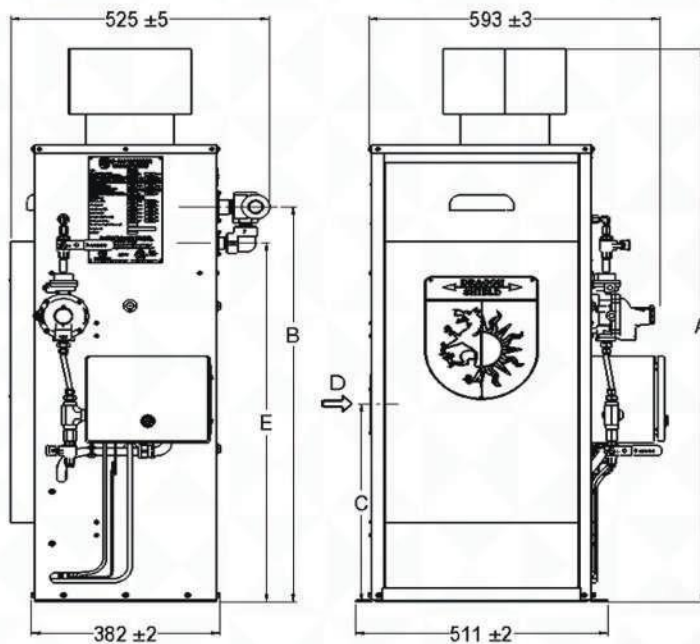
The vaporizer guarantees the adequate gas flow to the inlet line to satisfy the fuel demand required for optimal operation.

WE OFFER TWO DIFFERENT CAPACITIES

MODEL	VAPORIZATION CAPACITY (NOMINAL *)	
	Gal/h	MBTU/h
DS-80 WG	80 Gal/h	7,044,300
DS-120 WG	120 Gal/h	9,392,400

*The volumetric flow expenses are declared as "nominal." These may vary due to the conditions of the installation in which the equipment is located.

*The actual vaporization capacity will depend on factors that are part of the installation and loss of 15% to 20% of the nominal capacity.



UNIT SIZE

D - Liquid inlet height
B - Steam outlet height

* Liquid inlet diameter: 1 ¼"

* NPT for all models

Steam outlet diameter:

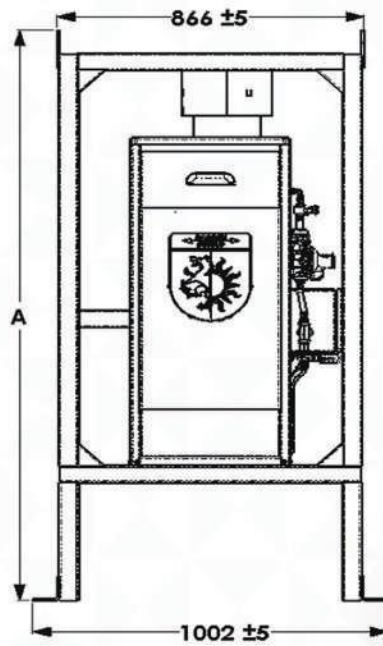
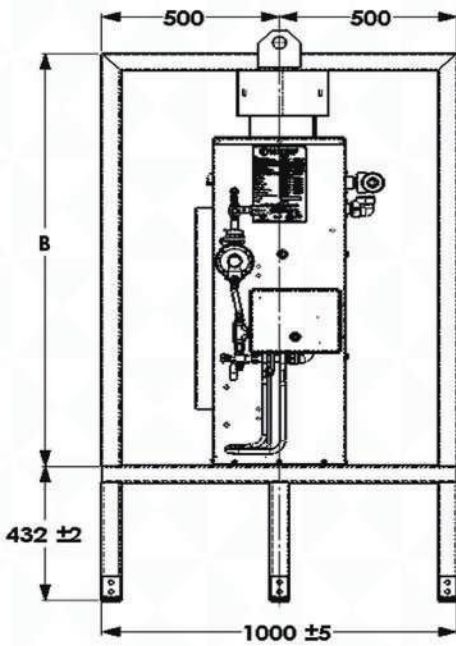
- 1" NPT in model 80
- 1" NPT in model 120

Code	Model	A		B		C		D		E	
		inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
GA51204146-U	DS 80 WG	50-3/4"	1290	35-7/8"	912	18"	457	1-1/4"	32	35-5/8"	828
GA51204147-U	DS 120 WG	58-5/8"	1488	44-7/32"	1123	28-5/16"	719	1-1/4"	32	40-15/16"	1040

1.2 CAGE

Every Dragon Shield Direct Fired Vaporizer includes a multi-purpose cage:

1. Protect the vaporizer during the transportation
2. Easy handling for crane and forklift operations
3. Serves as a foundation base to install the vaporizer for operation



80 WG

Code	Model	A		B		Weight	
		inches	mm	inches	mm	kg	pounds
GA51204146-U	DS 80 WG	72-11/64"	1833	52-1/4"	1327	202	445

120 WG

Code	Model	A		B		Weight	
		inches	mm	inches	mm	kg	pounds
GA51204147-U	DS 120 WG	78-35/64"	1995	58-19/32"	1488	228	503

VAPORIZER FEATURES

DRAGON SHIELD COMPONENTS

- a) Cabinet with chimney
- b) Liquid inlet valve
- c) Heat exchanger
- d) Burner and pilot
- e) Temperature control (Thermostat)
- f) Electronic ignition system
- g) Thermal box
- h) Capacity control valve
- i) Pressure regulator
- j) Safety valve

VAPORIZER INSTALLATION

ELEMENTS COMPRISE PART OF THE INSTALLATION

The main elements that make up the typical installation for direct fired vaporization equipment are:

- Storage Tank
- Direct Fired Vaporizer (Dragon Shield)
- High-pressure Regulator (CMS 041)
- Pressure Gauges and Thermometers

AUTO SUPPLY OF GAS TO THE REGULATOR FROM THE HEAT EXCHANGER

Once filled with gas in a liquid state, the heat exchanger provides sufficient natural vaporization to ignite the vaporizer for the first time. Once the burners are in operation, the system consistently generates steam to be partly used to power the burner system.

INSTALLATION

Before proceeding with the installation of a vaporizer, please inquire and comply with local regulations for LPG equipment.

Install the vaporizer on a level, firm base made of non-flammable material. Firmly anchor it with the four screws in a location with good ventilation, preferably where there is no vehicle traffic.

The vaporization system must be done according to Figure No. 1, as described in Table No. 5, which details each models inlet and outlet pipe diameters.

The installation described in Figure No. 1 is for the basic system that in addition to complying with applicable national and international standards has proved to be the easiest and most efficient.

Pipeline dimensions must be proportional to the flow rate that will be used. As well as, to the pressure drop calculated from the regulation block to the consumption centers, making sure the installation is projected with two-stage regulation.

INSTALLATION DIAGRAM

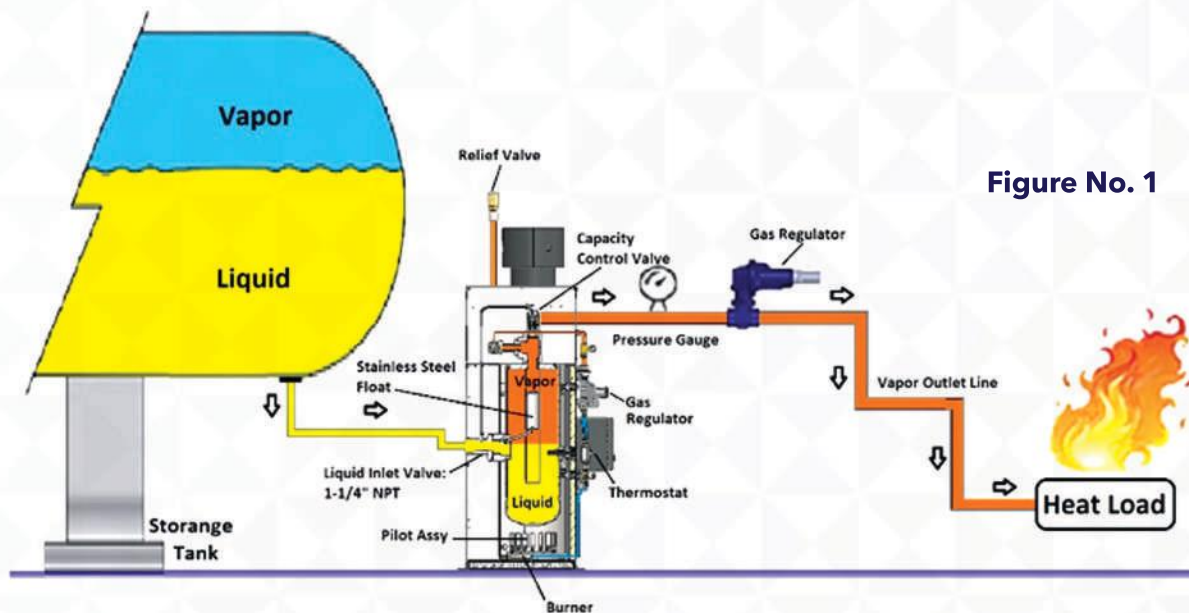


Figure No. 1

VAPORIZER FUNCTIONALITY

When opening the bypass valves, the liquid will flow either by gravity or by pressure difference from the storage tank to inside the vaporizer's heat exchange containers, and said flow will stop when the liquid level rises the floater inside them, thus closing the inlet valve.

When the burner is turned on, the heat it provides will accelerate the liquid's evaporation inside the heat exchanger, generating the sufficient amount of liquid to supply the system. As a consequence of this, the liquid level will decrease inside the exchanger, making the floater drop and open the inlet valve to replace any evaporated liquid. In constant demand conditions, the inlet valve will remain partially open, replacing the liquid as it evaporates.

In variable demand conditions, the inlet valve will open and close as the liquid level varies inside the exchanger. Thus, incoming liquid will be heated and cooled according to demand, turning the thermostat on and off.

Whenever the vaporizer is in operation and the liquid inside the exchanger has reached the temperature at which the thermostat was calibrated, the main burner will turn off and the liquid level will drop, activating the inlet valve which will allow cold liquid back in. This will turn the thermostat on, igniting the main burner. This cycle will continually repeat itself as the vapor phase propane demand varies.

IMPORTANT:

Requirements for installations in the USA and Canada.

Canadian Installations: The vaporizer and piping shall be installed in accordance with Natural Gas and Propane Installation Code, CAN/CSA-B149.1, the Canadian Propane Storage and Handling Code, CAN/CSA-B149.2, and electrical components installed in accordance with the Canadian Electrical Code, CSA C22.1, Part I.

US Installations: The vaporizer shall be installed in accordance with Liquefied Petroleum Gas Code, NFPA 58, and electrical components installed in accordance with the National Electrical code, NFPA 70.

VAPORIZER SPECIFICATIONS (CHART NO. 5)

Capacity	80 WG	120 WG
Design Pressure	250 PSIG	250PSIG
	17.2 Bar	17.2 Bar
Relief Valve	✓	✓
Hydrostatic Pressure	435 PSIG	435 PSIG
		29 Bar
Liquid Inlet (NTP)	1-1/4"	1-1/4"
Vapor Outlet	1"	1"
Vaporization Capacity		
US Gal/h	80	120
MBTU/h	7	9.4
Burner Outlet		
(.000) Kcal/h	24002	35,020
(.000) BTU/h	95,249	138,963
Certifications		
ASME	✓	✓
ISO 9001	✓	✓
CRN	✓	✓
UL	✓	✓
Weight		
Kg	144	168
Lb	317	370
Weight with Cage		
Kg	202	228
Lb	445	503

FUNCTIONALITY

Dragon Shield Vaporizers are manufactured to work under extreme weather conditions.

This equipment works with a direct fired system, which receives gas in liquid state, turning it into a gas state.

They are ideal for consumption that exceeds storage tank evaporation capacities.

OPERATION

EQUIPMENT START-UP

During the equipment's start-up, it is imperative to run a preheating cycle. If this initial step is not completed, there is a risk of liquid seeping to the service line.

EQUIPMENT OPERATION

ONLY TRAINED AND SKILLED PERSONNEL SHOULD OPERATE THIS EQUIPMENT.

NOTE: Before the vaporizer is installed, lines need to be swept. This will help guarantee pipelines without impurities that could damage the equipment.

1) Before the vaporizer is put into service, make sure the valves at the start of the line are open and the valves at the end of the line are closed.

2) Fill the vaporizer with liquid, slowly opening the bypass valves, located between the storage tank and the vaporizer (CAUTION: if these valves are opened too quickly, there is a risk of closing of the valves with excess gas in the tank). If excess gas is present, close the valve that is next to the tank and allow time for the valve to achieve balance. Then open and repeat the operation slowly.

3) Open the supply valve to the regulator and burners.

4) Turn the thermostat dial to the "RUN" position. Press the electronic ignition switch, making sure the spark plug generates the electric arc discharge to turn the pilot on. Once the spark is generated properly, press the button at the top of the thermostat, releasing it after 30 to 60 seconds. After the button is released, the pilot should remain ignited. For the initial operation, the pilot

ignition may take some time, since it requires ventilation of all air contained in the pipe. If this is the case, purge the line from the storage tank until all air is vented.

5) Turn the thermostat knob to the open position, set the thermostat temperature dial to "MAXIMUM" so that the vaporizer turns on.

6) Once it is on, allow the main burner to "heat up" until the preheating cycle is done and it turns off.

NOTE: During this operation it is very important to make sure the pressure gauge reading to the vaporizer outlet does not surpass the storage tank pressure, for the safety valves trigger at a 17.5 Kg/cm² pressure. If this should happen, turn the thermostat to the off position immediately. Open the valve to the vaporizer outlet and relieve the pressure.

In the liquid line that runs from the storage tank to the vaporizers, it is crucial not to use non-return valves, as this prevents the inlet valve from exchanging vapor with the tank and equalizing pressure during preheating. In addition, all the liquid valves must remain open during the preheating process.

7) Gradually open the vapor valves that feed all the piping. In this process, the vaporizer may turn on again, allow the vaporizer to finish an operation cycle to start lighting the consumption devices. Set up the regulators to the desired service pressure between 0.7 and 1.5 Kg/cm² (gauge pressure), the lower the temperature the lower the pressure to prevent the LP Gas from condensing.

8) The vaporizer will continue to run on and off cycles according to the consumption line demand.

9) If the vaporizer will be taken out of service for short periods, close the vapor outlet valve and turn the thermostat dial to the "RUN" position.

IF THE VAPORIZER WILL BE OUT OF SERVICE FOR LONG SERVICE PERIODS, FOLLOW THE INSTRUCTIONS INDICATED BELOW:

a) Close the liquid bypass valve at the entrance of the vaporizer and let the consumption exhaust all the liquid inside the vaporizer. This is shown by a drop in the vapor outlet line pressure.

b) Turn the thermostat dial to the "OFF" position and close the burner feed bypass valve.

c) To resume operation, repeat steps 2, 3, 4, 5, 6 and 7.

MAINTENANCE AND SERVICES

Vaporizers, as any other LP Gas equipment, require periodical checks and maintenance. The next points are a maintenance guide. However, their frequency may vary depending on each installation, as well as the propane usage characteristics and quality of the propane that is vaporized.

ONLY SKILLED AND AUTHORIZED PERSONNEL SHOULD PERFORM MAINTENANCE ON THIS EQUIPMENT.

Before performing any service on a component or accessory in the circuit, it must first be isolated and depressurized by purging all gas in that section. In addition, all types of ignition sources must be cleared from the area where the service is being performed (clearly at least a 10m radius).

ELEMENTS SUBJECT TO MAINTENANCE

Components subject maintenance are:

Part Name	Model	Code
Burners	DS	GA51193159-U
Pilot	DS	3540907045-U
Thermocouple	BC-10	GA51423814
Inlet Valve	DS	GA51193120-U
Control Valve	DS	GA51193128-U

ELEMENTS NOT SUBJECT TO MAINTENANCE

There are components that have a finite life cycle, or once activated and expired will require replacement. These include:

Item	Model	Code
Regulator (Replace annually)	REGO LV4403	GA51477118
	Fisher R232A-BBF	GA51477120
	CAVAGNA 98TW-15	GA51477121
Security Valve (Replace after activation)	REGO	GA51484062
Electronic Ignition (Replace as needed)	DS	GA51214157-U
Battery (Replace every 2 years)	ENERGIZER L522	1890906996-U
Thermostat (Replace as needed)	SIT 600-AC2	1890907024

The Dragon Shield Vaporizers uses 3 different trademarks of regulators. When necessary to replace the regulator of the vaporizer, it is important to replace it for the same trademark and model of regulator that was originally sent from the factory since each model uses a different assembly.

SERVICE PERIODS

Daily service	
General system	Check the whole vaporizer for leaks
Pilot	Inspect pilot assembly, make sure that the device is turned on with the proper flame
Electronic Ignition	Verify that the whole system is capable of generating the spark ignition properly
Monthly Services	
Drain regulator line	Remove the plug and open the drain valve to purge the line of impurities
Burner Assembly	Clean the jet burner orifice and Multi-port Burner
Relief Valve	Check that there are no corrosion and the cap protector installed
Every six months	
Thermostat	Check the thermostat for proper operation. If the thermostat is not operating properly, it should be replaced.
Thermocouple	Check the thermocouple -read while hot- is delivering the proper voltage to the thermostat (13 to 30 millivolts) a lower than 13 millivolt reading indicates the thermocouple should be replaced
Regulator	Keep the regulator clean, make sure that there is no damage to, or foreign material in the regulator, Clean out the exhaust vent and be sure it is not clogged If there is evidence of foreign material inside the vent the regulator should be replaced.
Liquid Inlet Valve	A careful visual inspection (using a flashlight) and check for leaks around the liquid inlet valve (free of foreign debris)
Heat Exchanger	Check the whole heat exchanger for holes or excessive scale and remove any strange material, Check the bottom head for pitting. Should pitting in excess of 3mm, should be replaced the heat exchanger.
Electronic ignition	Is important to make sure the battery is in a good state of charge. A defective or poorly charged battery will cause the various components of the ignition system to work incorrectly when they are being worked, Make sure all wiring connections are clean and tight, not only at the battery but also at all terminals

TROUBLE SHOOTING

Trouble Shooting		
Symptom	Probable Cause	Remedy
Flame is not adequate	· Jet burner clogged	Clean the jet burner (use a hard wire size properly to poke the waste out and clean of the jet burner)
Electronic Ignition system doesn't generate electric arc	· Badly installed or discharged the battery	Verify the correct installation of the battery, in case it has no charge, you must replace it
Pilot does not stay lit	· Loose thermocouple	Check the connection, make sure it is correctly installed
	· Thermal safety device of the thermostat is operating	Allows cooling of the thermostat for a period of approximately 10 minutes and turn it on again. (check for obstructions to the pilot and at the pilot)
Pilot turns off frequently	· Air currents	Make sure air circulation around the vaporizer is adequate to avoid any excessive air currents, is recommended adequate protection
	· It is possible that the thermocouple has liquid or carbonized sediments inside	Check thermocouple signal to thermostat control valve. Signal should be 13 to 30 millivolts when thermocouple is hot, clean the thermocouple. If the fault persist, replace thermocouple.
Main burner will not ignite	· Pilot off	Check the pilot burner to see if it is clear of any obstructions
	· Clogged jets burner	Clean each burner orifice
	· Damaged thermostat	Check the thermostat for proper operation (see start up procedure). If the thermostat is not operating properly it should be replaced (the thermostat cannot be serviced)
Pressure drop	· Main burner working poorly	Verify operation, check for a plugged gas line to the burner.
	· The shut off valve and excess flow valve are closed	Check liquid and vapor valves, if necessary, open them
	· Filter capped	Clean the filter mesh
	· Inadequate equipment selection	Vapor demand exceeds vaporizer capacity

EMERGENCY CONTROL

In the event of a gas leak or if a fire breaks out, it is critical to carry out the following maneuvers immediately:

- 1) Turn off the burners and the pilot, turning the thermostat dial to the off position.
- 2) Turn off the Electronic Ignition, if possible, uninstall the System battery.
- 3) Close the control valve or valves closest to the equipment to eliminate any possible flame or spark points.

4) Prevent accidental vapor ignition controlling and eliminating any possible flame or spark points.

5) Prevent leakage of liquid phase or vapor propane to the lower levels or basements of nearby buildings.

WARRANTY

Warranty. Dragon Shield LLC, warrants to all parties all equipment manufactured and sold by it to be free from defects in material or workmanship under normal use and service, when installed and used in accordance with all applicable state and local codes, regulations and laws in accordance with National Fire Protection Pamphlet 58. For installations in Canada they should follow Natural Gas and Propane Installation Code, CAN/CSA-B149.1, CAN/CSA-B149.2.

Dragon Shield agrees to repair or replace any equipment which its examination reveals to have been defective due to errors in workmanship or material, if returned to Dragon Shield the unit must be shipped to the representative from which the unit was purchased, transportation charges prepaid.

Deviations from recommended applications, system design, installation and service practices, as well as deterioration or wear due to foreign materials or contamination present in LP-Gas or air shall be considered as abuses and render this warranty void.

Problems and defects must be submitted by mail to: customerservice@dsvap.com with a detail explanation of the failure.

This warranty applies for a period of one year from date of installation, but not more than eighteen months after shipment from factory. This warranty is expressly in lieu of all other warranties expressed or implied, and of all obligations or liabilities on its part for damages including but not limited to consequential damages, following the use or misuse of equipment sold by it. No agent is authorized to assume any liability for **Dragon Shield**, except as set forth above.

Notwithstanding anything herein to the contrary, with respect to paints and coatings, **Dragon Shield** warrants that it will apply paints and coatings in accordance with the specifications and recommendations of the manufacturer thereof; provided, however, that **Dragon Shield** makes no warranty, expressed or implied, with respect to the paints and coatings or to the validity of manufacturer's specifications and recommendations.