Fundamentals of LPG Vaporizers and LPG Vaporizer/Mixer Systems

Terminology

Throughout this article, the terms

- Propane, Butane, LPG, and LP are used interchangeably;
- Natural Gas is abbreviated as NG or NatGas;
- LP/Air, LPG/Air, Propane/Air, mixed gas, MixGas, Synthetic Natural Gas, and SNG are used interchangeably;
- SNG is the acronym for Synthetic NatGas;
- Mixer and Blender are used interchangeably.

Introduction

Alternate Energy Systems, Inc. manufactures LPG Vaporizers, LPG Vapor / Air Mixers (Blenders), and complete Systems for use as standby plant, for peak shaving, and as primary gas supply. Since the company was founded in 1974, we have manufactured a wide variety of individual components and packaged systems. These components and packages, complete with interconnecting piping, wiring, and control and monitoring equipment, are thoroughly factory tested, and are ready for connection to liquid LPG supply, properly sized electrical supply, and mixed gas outlet.

In addition to LP and LP/Air Systems, AES also manufactures gas/gas blenders for applications such as NatGas Stabilization; Landfill Gas Replacement/ Backup; Digester Gas Replacement and Enrichment; Coke Gas Replacement/ Backup; Air/Nitrogen Blending; etc.

Alternate Energy Systems (AES) is a company operated by people with a vast knowledge of the industry. People who are aware of energy problems - and know how to solve them. Every member of AES has been closely involved with the energy industry in the past and continues to offer a more valid and precise solution for your energy needs now and in the future.

All equipment manufactured by Alternate Energy Systems is available in various sizes and configurations, and with various options. Please consult with your area distributor or the factory for your specific requirements.

What is a LPG Standby Plant?

A "standby plant" - as the term implies, is something standing by to do a job. A Propane standby plant, offered to industrial and utility users of NatGas, is a system that is an alternate source of energy in the event the NatGas source becomes unavailable (because of curtailment, maintenance shutdown, or catastrophic failure).

While some facilities use oil as a standby fuel, oil is not a direct replacement for NatGas and will not burn in NatGas burners or equipment. Thus, oil requires a separate set of burners, controls and piping (which increases the equipment cost).

Propane or LPG is an ideal standby fuel for NatGas. Propane, when mixed with air, will duplicate the burning characteristics of NatGas and allows the user to utilize existing NatGas burners, piping and controls. There is generally no need to change the setup of the combustion equipment when the fuel supply changes from NatGas to LP/air, or from LP/air to NatGas.
A standby system generally consists of:

- LPG STORAGE TANK(s);
- A PUMP to transfer LPG to the Vaporizer;
- A VAPORIZER to convert the liquid LPG to a gas;
- A MIXER or BLENDER to mix the vaporized LPG with air.

Why use a Standby System?

While there are many reasons a standby system is used, the principal reason is insurance against interruption of normal NatGas supply. Another incentive is that many utility companies offer what is known as an "interruptible rate" to industrial customers.

Interruption of NatGas?

Many are not aware that NatGas utilities (local distribution companies [LDC]) purchase or contract from a pipeline, a certain amount of NatGas transportation capacity for a certain period. The contracted capacity has to be sufficient to supply all "firm gas" customers (both residential and industrial) on the coldest day of the year →

By definition, this means that the contracted transportation capacity is under-utilized during the other 364 days in a year.

To better utilize the contracted transpor-tation capacity, LDCs like to add large NatGas users as "interruptible" load. If the pipeline capacity that is normally occupied by the interruptible customers is needed to supply gas to "firm" customers, the LDCs ask their interruptible customers to stop using NatGas and to switch to their LP/Air standby system.

As an incentive for these interruptible customers to install a standby system, the LDCs offer steep discounts on the price of NatGas. The savings are available year-round, regardless whether or not the NatGas is ever curtailed.

Since the "interruptible rate" is enjoyed every day of the year, not just during cold months when gas is most critical, it is possible to amortize the cost of a standby facility, including the installation, over a very short period of time, usually in less than two years.

With a useful life of a standby system of 15-20+ years, this means that significant energy cost savings are being realized by the owner of the standby system year-after-year, with only upkeep and maintenance as recurring expenses.

What is a PeakLoad Shaving Plant?

Peakload Shaving (also called PeakShaving) is a term used by the utility companies.

As stated before, LDCs purchase a certain amount of gas over a fixed period of time. The best-laid plans cannot take into consideration unexpected cold spells, a burst pipeline, or other events that could happen to disrupt the planned quota.

If the LDC should need more gas than it has contracted, they pay a premium price – if the gas is available, to begin with. So, to insure extra gas and avoid premium price for gas above the contracted amount, many utility companies use LP, mixed with air, to duplicate the properties of NatGas. This mixed gas is then used to supplement the LDC's gas supply, allowing a more consistent fuel rate from their supplier and help meet peak demand loads.

Who uses a Standby Plant?

Utilities and municipalities; clay product manu-facturers; glass plants; bakeries; metal pro-cessing firms; textile industries; chemical com-panies; or, any industrial company that uses large amounts of NatGas in any of its processes.

What is LP-Gas?

LP-Gas or LPG is the abbreviation for liquefied petroleum gas, with the most commonly known being Propane and Butane. At normal atmospheric pressure and temperatures, LP□Gas is in the gaseous state. However, it is converted to the liquid state with moderate pressure. This is why LPG is transported and stored in tanks or containers having at least 250 psi working pressure.

The main source of LPG is NatGas and crude oil mixtures as they come from active oil and NatGas wells. Though Propane is similar to NatGas (Methane), Propane has 2516 BTU per cubic foot (22390 kcal/m³), compared to 1020 BTU per cubic foot (9005 kcal/m³) for NatGas. That is why Propane, when mixed in proper proportion with air, is an excellent supplement or replacement to NatGas.

Properties of		NatGas	Propane	Butane
Chemical Formula		CH_4	C_3H_8	C_4H_{10}
Boiling point of liquid at atmospheric pressure	°F °C	-259 -162	-44 -42	32 0
Specific Gravity of vapor (Air = 1)		0.6	1.53	2.00
Specific Gravity of liquid (Water = 1)			0.51	0.58
Calorific value @ 60 °F Calorific value @ 15°C	BTU/cuft kcal/m^3	1012 9005	2516 22,390	3280 29,190
	BTU/gal kcal/liter		91,690 6,100	102,032 6,790
	BTU/lb kcal/kg		21,591 11,995	21,221 11,790
Latent heat of vaporization	BTU/gal kcal/kg		785 103	808 93
Liquid weight	lbs/gal kg/liter		4.24 0.508	4.81 0.576
Vapor volume from 1 gallon of liquid at 60 °F Vapor volume from 1 liter of liquid at 15 °C	cuft m^3		36.39 0.272	31.26 0.234
Vapor volume from 1 lb. of liquid at 60 °F Vapor volume from 1 kg of liquid at 15 °C	cuft m^3		8.547 0.534	6.506 0.406
Combustible limits (gas in air)	%	5 - 15	2.4 - 9.6	1.9 - 8.6
Amount of air required to burn 1 cuft. of gas Amount of air required to burn 1 m^3 of gas	cuft m^3	9.53 9.53	23.86 23.86	31.02 31.02
Ignition temperature in air	°F °C	1200 650	920-1020 490- 550	900-1000 480- 540
Maximum flame temperature in air	°F °C	3568 1964	3595 1980	3615 1991
Octane Number		100	Over 100	92

All data is approximate.
For actual properties of any particular batch, contact your fuel supplier.

What is a LP Vaporizer?

As shown above, LPG (Propane, Butane, or Propane/Butane Mixture) at ambient pressure (above its boiling point temperature) is a gas that is stored in pressurized containers (tanks) in liquid form. The space in the tank that is not filled with liquid is occupied by vapor. As this vapor is being used as fuel for connected equipment (burners, heaters, etc.), liquid LPG must vaporize (change its state from liquid to gas) to occupy the space above the liquid.

Any time a change of state occurs, energy is required.

If the ambient temperature is above the boiling point of the LPG (Propane -44°F / -42°C; Butane 32°F / 0°C at ambient pressure; see chart above for the boiling temperature of LPG at various pressures), this energy is transferred in the form of heat from the ambient air through the steel walls of the storage tank, into the LPG. As the heat is transferred from the ambient air to the vaporization process, the ambient air "looses" this energy and cools down.

The amount of heat that is transferred into the LPG determines the rate of vaporization. As the ambient air cools down, the rate of vaporization slows down, and stops completely when the ambient air is at the same temperature as the boiling point of the LPG. Therefore, naturally occurring vaporization cannot be used for large gas loads, or in low ambient temperatures.

A vaporizer is designed to receive the liquid LPG and raise its temperature (heat the liquid) well above the boiling point at the delivery pressure. In other words, a vaporizer generates the energy (heat) that is required to maintain the gaseous state of the LPG.

The heat required to change the state of the LP from liquid to gaseous is also called the latent heat of vaporization. Typical LPG requires a heat input of approximately 800 BTU to vaporize 1 gallon of liquid (approximately 100 kcal per kg of liquid). AES vaporizers are designed to generate approximately 1.5 times the latent heat of vaporization. The excess heat is carried by the LP vapor as superheat. Superheat is required to maintain the gaseous state of the LP downstream of the vaporizer.

There are two major types of LPG vaporizers: Vaporizers that supply a small portion of the vaporized LPG as fuel for a burner that supplies the heat for the vaporization process (i.e. Water Bath Vaporizers); and vaporizers that use an outside source of heat, such as steam or hot water or electricity, to vaporize the propane.

Approximate Vapor Pressure in psig
Approximate Vapor Pressure in bar

Temperature		Propane ----> To ----> Butane							
° F	° C	100%	95/5*	80/20	60/40	50/50	40/60	20/80	100%
-40	-40.0	3.6 0.248	1.3 0.090						
-30	-34.4	8 0.552	5.5 0.379	4.5 0.310					
-20	-28.9	14 0.965	11 0.758	9.2 0.634	4.9 0.338	1.9 0.131			
-10	-23.3	20 1.38	17 1.17	16 1.10	9 0.621	6 0.414	3.5 0.241		
0	-17.8	28 1.93	24 1.66	22 1.52	15 1.03	11 0.758	7.3 0.503		
10	-12.2	37 2.55	32 2.21	29 2.00	20 1.38	17 1.17	13 0.896	3.4 0.234	
20	-6.7	47 3.24	41 2.83	36 2.48	28 1.93	23 1.59	18 1.24	7.4 0.510	
30	-1.1	58 4.00	52 3.59	45 3.10	35 2.41	29 2.00	24 1.66	13 0.896	
40	4.4	72 4.96	63 4.34	58 4.00	44 3.03	37 2.55	32 2.21	18 1.24	3 0.207
50	10.0	86 5.93	77 5.31	69 4.76	53 3.65	46 3.17	40 2.76	24 1.66	6.9 0.476
60	15.6	102 7.03	93 6.41	80 5.52	65 4.48	56 3.86	49 3.38	30 2.07	12 0.827
70	21.1	127 8.76	109 7.52	95 6.55	78 5.38	68 4.68	59 4.07	38 2.62	17 1.17
80	26.7	140 9.65	128 8.83	125 8.62	90 6.21	80 5.52	70 4.83	46 3.17	23 1.59
90	32.2	165 11.4	149 10.3	140 9.65	112 7.72	95 6.55	82 5.65	56 3.86	29 2.00
100	37.8	196 13.5	172 11.9	168 11.6	137 9.45	123 8.48	100 6.90	69 4.76	36 2.48
110	43.3	220 15.2	197 13.6	185 12.8	165 11.4	148 10.2	130 8.96	80 5.52	45 3.10

* HD5, Commercial Grade Propane
All data is approximate.
For actual properties of any particular batch, contact your fuel supplier.

What are Mixers and Blenders?

After the liquid Propane has been vaporized, it needs to be mixed in proper proportion with air to duplicate the characteristics of NatGas. This is where mixers and blenders come in.

There are several methods to mix air and LPG vapor. Probably the most simple method is to use a venturi and a nozzle. This method, as well as other methods, holds very accurate air-to-fuel ratios through a narrow range. This type mixer does not generally require compressed air for operation. However, the maximum achievable system pressure is somewhat limited. The mixture of air and vapor is fed into a surge tank, where it is maintained at a set pressure, and then drawn from the surge tank for use.

This type system is usually recommended for intermittent periods of use and is very simple to operate.

Blenders and modulating proportioning mixers are usually more complex, but are usually also more accurate than Venturi-type mixers. They are also capable of blending LP vapor with air in much larger volumes at much higher pressure. These systems are recommended for continuous or long periods of usage, and are ideally suited for PeakShaving and larger installations.

Regardless of the type vaporizer and mixer, a standby system can be designed for the requirements of small users, or the requirements of large industrial and utility users. In these times of uncertain oil prices and supplies, a standby system should be considered by all Natural Gas users. Just like we keep a spare tire for our automobile in the event of a flat, a standby system is a spare fuel supply in the event Natural Gas is interrupted or demand cannot be met.

ALTERNATE ENERGY SYSTEMS' VAPORIZERS

Alternate Energy Systems manufactures LPG vaporizers with capacities from 168 gallons per hour (322 kg/h) to 10000+ gph (19200+ kg/h). To meet the requirements of customers and particular applications around the world, we are employing a variety of design concepts and configurations. Their heat source can be hot water (Water Bath Vaporizers; Circulating Hot-Water Vaporizer) or steam (Steam Vaporizers).

The vaporizers are manufactured to the rigid codes of the American Society of Mechanical Engineers (ASME), the latest edition of NFPA #58 and/or #59, and most are approved for Factory Mutual (FM) or Industrial Risk Insurers (IRI) installations, in addition to approvals by Canadian Standards Association (CSA), American Gas Association (AGA), and Canadian Gas Association (CGA).

As a manufacturer, we go far beyond the requirements and codes and are continually working to produce equipment with the most modern engineering techniques available.

Water Bath Vaporizers WB-05 and -08 Series

All AES water bath vaporizers are of "horizontal" design. Top and sides are insulated to hold the temperature of the water bath. The vaporizing tube bundle and all propane piping conform to the standards of the ASME Boiler and Pressure Vessel Code and the latest edition of NFPA Pamphlet #58. The design is approved by Factory Mutual (FM) and Canadian Standards Association (CSA), and is accepted for Industrial Risk Insurers (IRI) installations.

A mixture of water and Propylene Glycol (antifreeze) is the heat transfer medium. A pump constantly circulates the solution to reduce heat stratification. The vaporizers are skid mounted, factory tested, primed, painted and ready for installation. They are ready for connection to properly sized electrical supply, liquid propane inlet and vapor outlet.

The vaporizers come with 2 sets of Operating Manuals and Test Reports, are designed for outdoor installation, and require only nominal preventive maintenance.

The model number (WB-XXX) designates the vaporization capacity in gallons per hour Propane vaporization at 0°F inlet temperature.

All WB vaporizers are manufactured with a protective enclosure for the burner and the control components. A walk-in-size control room is standard on all models WB-168 to WB-1505. Models WB-1805 and above are equipped with an extended control room (maintenance house), which is available as an option for all smaller models.

Model WB-168 thru WB-508

These models are manufactured with small “European” style power burners and a powder-coated sheet control room. These units utilize a mechanical thermostat for bath temperature control, otherwise they are identical in control and layout to the WB-455 thru WB-5505. Like the larger Vaporizers, these units come standard with a Honeywell 7800 series Electronic Flame Safeguard and PLC controls. Standard Electrical requirements are AC 220/230V 50/60 Hz, 15 A, single phase.

Model WB-455 thru WB-5505

These models are manufactured with high-efficiency power burners. All safety functions of the

vaporizer are constantly monitored by a Programmable Logic Controller (Allen-Bradley or Siemens PLC), which communicates with a graphic HMI (9" 1024x768 standard).

The HMI is used to monitor and display the system status; any failure message will be displayed in plain English; first-outage-monitor (in alarm history) is standard. The PLC is installed together with the Honeywell 7800 series Flame Safeguard in the control panel, which is mounted in the vaporizer control room. The full-size walk-in vaporizer control room can be extended to form a maintenance house, providing additional weather protection for operating and maintenance personnel (extended control rooms are standard on models WB-1805 and above). All control rooms are equipped with utility receptacles and light fixtures.

The vaporizers are equipped with a "smart" liquid carryover protection. Vapor pressure and temperature are constantly monitored by dedicated Rosemount pressure and temperature transmitters. Their signals are processed in the PLC and are compared against the vapor pressure/ temperature saturation curve of the LPG that is being vaporized. The properties of the LPG (Propane/Butane percentage), and the "safety margin" (how close the pressure/temperature are allowed to come to the saturation curve) can be entered through the HMI. If the safety margin is "breached", the liquid inlet solenoid valve is closed after an adjustable alarm delay period has elapsed.

Model WB-7000 thru WB-10005

These high-capacity models are usually configured for specific customer applications, for example for use by utility companies in PeakShaving systems. Since PeakShaving systems often operate at elevated pressures, the heat exchangers of these vaporizers are enlarged to increase the dwell time of the LPG in the vaporizer, thereby increasing the amount of superheat that is transferred to the LP vapor (see above).

Other modifications can include high-capacity water circulating pumps (to further reduce heat stratification in the water bath); NatGas fired burners (instead of LP fired burners); non-standard PLC configurations (i.e. for integration of the vaporizer controls into an existing SCADA system); etc.

Steam Vaporizers VSV-series

Alternate Energy Systems offers a complete line of vertical steam vaporizers in capacities from 200 gallons per hour to 5000+ gallons per hour. The steam tube is of multi-pass design to transfer the maximum heat to the LPG. The tube bundle and all propane piping conform to Section VIII, Division I of the latest edition of the ASME Boiler and Pressure Vessel Code. The pressure vessels carry the ASME "U" stamp and are National Board registered.

Standard configurations include steam flow control valve; dual liquid carryover protection through ultrasonic liquid level transmitter in the pressure vessel, and "smart" liquid carryover protection with Rosemount pressure transmitter and temperature transmitter in the vapor outlet; liquid inlet valve (solenoid valve); steam trap; and steam back check valve. Temperature gauges in steam inlet and outlet, and in pressure vessel shell and vapor outlet are standard.

Vaporizer design, wiring, controls, and electrical components and their installation comply with the latest editions of NFPA #58 and NFPA #70.

All safety devices of the vaporizer, including the dual liquid carryover protection, are monitored by a programmable logic controller (Allen-Bradley MicroLogix or Siemens S7-1200), which is connected to a color touch-screen HMI. The HMI provides start/stop control for the vaporizer; it displays the system status, and any failure conditions that may occur, in plain English (with date/time stamp). The electrical enclosure for the PLC and the operator interface are to be installed in a remote, non-classified location. A small explosion-proof enclosure, mounted to the vaporizer, provides local start/stop and alarm reset functions.

Circulating Hot Water Bath Vaporizers VWB-series

Water Bath Vaporizers for External Water Heaters (our VWB series) are specifically designed for applications where the owner prefers to use an existing hot water supply for the vaporization process.

Another typical application are installations where local or national codes prohibit the use of any kind of open flame in the vaporization process of LPG. Compared to vaporizers with local heat sources,

the VWB series offers an additional layer of safety due the lack of any high-power/high-energy component anywhere near the LPG.

Design and configuration of the VWB-series is very similar to the steam vaporizers (VSV-series), including the safety and control components.

ALTERNATE ENERGY SYSTEMS' MIXERS & BLENDERS

Alternate Energy Systems, Inc. manufactures a complete line of Propane-air blending and mixing systems, ranging in capacity from 7 MMBTU to over 1000 MMBTU per hour.
Our complete line of venturi (HVS) and POM Mixers utilize the finest quality material and knowledge to meet the requirement of agencies and insurance companies governing the LPG industry.

Venturi Mixers HVS-series

Our Venturi-type LP/Air mixers carry model numbers from HVS-7 (7 MM BTU/h [1.7 MM kcal/h]) to HVS-200 (200 MM BTU/h [50 MM kcal/h]).

All HVS Systems are designed to be used with an existing LPG vapor source, such as a vaporizer, or as the replacement for less efficient or less reliable LPG-vapor/air mixing systems. They come complete with steel skid, vapor inlet header, venturi arrangements, surge tank, electric/electronic controls, and all other equipment necessary for safe operation.

All HVS systems monitor the gas pressure in the surge tank. Smaller systems with one or two venturi arrangements use pressure switches and mechanical controls. Larger systems with three or more venturi arrangements use a pressure transmitter which is connected to a PLC. The PLC “sequences” the venturi lines and controls all system safety functions. The PLC also communicates with a color touch-screen HMI, indicating system pressures, and any trouble conditions that may occur. The PLC may also be used to “interlock” the HVS system with an external vaporizer.

Installations where the mixer system is separated from an open-flame vaporizer, and installations with electric vaporizers, require the option “Explosion Proof Control Components”, which includes explosion proof transmitters and solenoid valves. The control panel for these mixers must be installed in a non-hazardous location.

All AES HVS Mixers are equipped with two solenoid valves per venturi train. The “dynamic” solenoid valve opens and closes each time a venturi train is activated to produce mixed gas. The “static” solenoid valves opens when the mixer is started and stays open until the mixer is stopped, or until a high-pressure alarm occurs. This feature provides an additional level of safety and prevents the unwanted discharge of mixed gas in case of a failure of the “dynamic” solenoid valve.

All systems are manufactured to the require-ments of the ASME code, latest edition of NFPA #58, and approved for Factory Mutual (FM) or Industrial Risk Insurers (IRI) installations. The Model number (HVS) of the venturi system designates millions of BTU per hour Propane-air mixture.

Standard models have an output pressure of 5 psi Propane-air mixture. The output pressure can be adjusted between 4-8 psi. High pressure models with output pressure greater than 8 psi to 50 psi Propane-air mixture are equipped with an ASME “U”-stamped surge tank and require compressed air for operation. These air-assisted high-pressure models are identified by an "AA" suffix (i.e. HVS-50-AA).

Piston Operated Blenders POM-series

All POM Systems are designed to be used with an existing LPG vapor source, such as a vaporizer, or as the replacement for less efficient or less reliable LPG-vapor/air mixing systems. They come assembled on a steel skid, complete with electronic controls, and all other equipment necessary for safe operation.

A PLC (Allen-Bradley or Siemens) is used to monitor and control all system functions. The PLC communicates with a color touch-screen HMI indicating system status, system pressures, and any trouble conditions that may occur. The PLC may also be used to “interlock” the POM system with an external vaporizer. The mixer control panel is designed to be installed at a remote, non-hazardous location.

Pneumatically operated full-port ball valves in LPG vapor and compressed air inlets are standard. Vapor inlet, air inlet, strainers, check valves, and regulators are “flanged”.

Installations where the mixer system is separated from a water bath vaporizer or other vaporizer with an open flame; installations with electric vaporizers; and some local codes; require the option “Explosion Proof Control Components”, which also includes explosion proof transmitters and solenoid valves.

The simplicity of Alternate Energy Systems' POM blenders provide the ultimate in reliability and operation. With the exception of the POM valve itself, all components on the POM blender are non-proprietary. Pressure regulators are Fisher Controls; pressure transmitters are Rosemount; trim components are utility-grade; making operation, maintenance, and trouble shooting very easy even for less-experienced personnel.

The POM blenders meet or exceed industry specifications set forth by the ASME Boiler and Pressure Vessel Code and the latest editions of NFPA #58 and/or #59. After July 2006, all explosion-proof models are also available with European CE approval.

The uniquely designed, patented rotatable piston valve controls flow and mixed gas ratio, and regulates the BTU content of the mixed gas. The design makes these units virtually maintenance free and eliminates problems and restrictions commonly associated with diaphragms, piston rings, and flow meters of other mixers. Once set, the unit will mix two gases at the same ratio, regardless of downstream demand.

When used with the optional "Accu-Blend™" system (a PLC-based controller combined with a signal from a gravitometer, calorimeter, Wobbe Index Meter or other BTU measuring device), the system will automatically control the mixed gas properties (BTU content / Wobbe Index).

ALTERNATE ENERGY SYSTEMS’ PACKAGED SYSTEMS

Alternate Energy Systems, Inc. manufactures a complete line of packaged standby equipment. These packages, complete with interconnecting piping and wiring, are ready for connection to liquid LP inlet, properly sized electrical supply, and mixed gas outlet.

These packages are skid mounted and can be factory-equipped or field-modified to accept flow control systems, specific gravity meters, non-standard control systems; or a large number of other options to allow the customization of any system to meet the requirements of any specific application.

Water Bath Vaporizer with Venturi Mixer Package

These single-skid mounted, packaged systems utilize a horizontal water bath type vaporizer with venturi type mixing system and are designed for capacities of 14 MM BTU to 250 MM BTU per hour. Manufactured to meet or exceed requirements of the ASME Pressure Vessel Code and latest edition of NFPA Pamphlet #58, they are approved for Factory Mutual (FM) or Industrial Risk Insurers (IRI) installations.

Standard design output pressure between 4 and 8 psi Propane-air mixture. Higher pressures of 9 to 50 psi are also available and require compressed air for operation. The vaporizer model number (WB) designates gallons per hour Propane vaporization at 0 °F inlet temperature, and the mixer model (HVS) designates millions of BTU per hour Propane-air mixture. Electrical requirements vary with vaporizer/mixer size. The model number for the capacity requirement governs the type of vaporizer, burner, and safety features. Refer to Sections Vaporizers and Mixers for more information.

Water Bath Vaporizer with POM Mixer Package

These single-skid mounted, packaged systems utilize the water bath vaporizer and piston operated mixing system and are designed for capacities of 20 MM BTU to 500+ MM BTU per hour. Complete with interconnecting piping and wiring, they are ready for connection to liquid Propane inlet, compressed air inlet, properly sized electrical and mixed gas outlet.

Requiring clean, dry compressed air for operation, the mixing system shares a common skid with the water bath vaporizer. Applicable for continuous duty or total stand-by, the units are designed for better than 30:1 turndown ratio.

Complete with PLC-based control panel, the systems have automatic safety shutdown with manual re-start.

The vaporizer model number (WB) designates gallons per hour Propane vaporization at 0 °F inlet temperature, and the mixer is sized according to millions of BTU per hour Propane-air mix requirements and system pressure requirements. Refer to Sections Vaporizers and Mixers for more information.

Other Packaged Vaporizer/Blender Systems

Many of the vaporizers and mixing/blending systems manufactured by Alternate Energy Systems, can be manufactured inside standard ISO shipping containers; palletized on structural steel skids to include compressors; or customized to meet the requirement of any user. For more information, contact your area distributor or the factory.

ALTERNATE ENERGY SYSTEMS' ACCESSORIES

Alternate Energy Systems has a complete line of accessories and LPG equipment to compliment and complete any Propane standby system. We manufacture or carry a complete line of pump packages, valves, controls, metering systems, flow controlsystems and tie-in assemblies.

ALL EQUIPMENT MANUFACTURED BY ALTERNATE ENERGY SYSTEMS IS AVAILABLE IN VARIOUS CONFIGURATIONS AND WITH VARIOUS OPTIONS. PLEASE CONSULT YOUR AREA DISTRIBUTOR OR THE FACTORY FOR YOUR SPECIFIC REQUIREMENTS.

ALTERNATE ENERGY SYSTEMS RESERVES THE RIGHT TO MAKE CHANGES -OR ADD IMPROVEMENTS- WITHOUT NOTICE AND WITHOUT ACCRUING ANY OBLIGATION TO MAKE SUCH CHANGES OR ADD SUCH IMPROVEMENTS TO PRODUCTS SOLD PREVIOUSLY.

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