NG and LP Vapor Fuel System Installation

Vapor fuel line should be of sufficient size to prevent fuel pressure drop at full load operation. Vapor fuel pressure regulator should be set at **7-11 inWC**.

All fuel lines must be a minimum of 12" from exhaust system components, with adequate airflow around pipes, and properly shielded from radiant heat.

Fuel line used in stationary applications should be of ***Black Malleable Iron*** or ***Steel***. Galvanized steel pipe is not recommended or approved. A flexible line of suitable material, (***steel flex pipe*** or ***braided stainless*** is recommended) should be used between engine's fuel shutoff valve and supply line with a manual shutoff valve. Dual fuel systems must have shutoff valves on both supply lines.

Fuel supply line fittings must be assembled with O2 sensor safe thread sealant. ***ZPP*** recommends the use of Loctite 592 Thread Sealant, or equivalent.

All fuel lines should be properly supported and strapped to prevent vibration and undesired motion and free from kinks or bends with the least amount of elbows necessary. ***ZPP*** recommends a maximum of 1, 90° elbow per installation.

The following are guidelines for vapor fuel supply line installation:

Supply Line	NA416	NA428	NA644	NA857	NA665	NA690	TA690	TA6120
½"	•							
¾"		•	•					
1"				•	•	•		
1 ¼"						•	•	
1 ½"							•	•

LPG Liquid Withdrawal Fuel System Installation

All LPG Liquid Withdrawal systems must utilize a hydrostatic relief valve or a device providing pressure-relieving protection that complies with section 2-4.7 of NFPA 58.

Relief valve should be installed in each section of piping (including hose), in which liquid LP-Gas can be isolated between shutoff valves, to relieve the pressure that could develop from the trapped liquid, to a safe atmosphere.

Recommended LPG liquid fuel supply line should be 3/8".

Electronic and Electrical Components

All electronic components and controls should me mounted to control ***vibration*** to ***3g***'s or less.

Due to the sensitive nature of electronic components, all electrical emission sources should be considered during product installation. Electrical emissions can cause erratic operation of electronic control devices.

Electrical and electronic components should be spaced at least 12", if practical from exhaust components and other external heat sources. Proper shielding and airflow should be provided to protect all sensitive components.

Batteries and battery cables should be sized according to the specifications as outlined in the engines Owners and Operators Manuals.

Cooling and Airflow

Engines should be mounted as to maximize the amount of outside air across the engine and through the radiator while taking measures to prevent heated air from recirculating back through the cooling system.

ZPP recommends the use of an air duct, no smaller than the radiator core, in buildings or enclosure installations, to prevent recirculation.

Radiator ***vibration*** should not exceed ***1.5***g.

Engine Environment

Engines should be located and positioned to reduce the effects of wind, weather, temperature, and environmental conditions such as;

- Engine air intake temperature
- Airflow
- Air borne contaminants (Dirt, sawdust, fibers, insects, animal feathers or fur, etc.)
- Moisture
- Snow and Ice

Air inlet temperature should not exceed ambient temperature. Measurements between ambient and manifold temperature sensor should not exceed 30° F.

High air inlet temperatures can cause engine detonation and improper fueling which can lead to poor performance and severe engine damage.

Electrical components and controls should be properly shielded from water. Damage from weather or moisture is not considered a warrantable condition.

Engine Mounting

Engines should be mounted level on a solid surface or frame while reducing vibration to the absolute minimum.

Frames should include provisions for securing engine mounting legs to the extent of **all** mounting holes. Engine mounting legs should never be left unsupported.

Failure to follow engine mounting steps may result in severe damage to cooling system components and severe injury to bystanders.

Isolation mounting can be utilized provided that ***proper earth grounds*** are used to insure the reduction of electrical emissions as well as static electricity.

Exhaust System Installation

All fuel system components, wiring, and electronic components should be protected from exhaust heat sources.

Catalysts should be mounted horizontally. If application does not permit, ***ZPP*** will review and have the ultimate decision on the installation.

Catalysts should be mounted with flex pipe and provisions to reduce the ***vibration*** to less that ***3g***'s.

Exhaust pipe size should be at least the same size as provided, or recommended by ***ZPP*** in the ***Emissions Related Installation Instructions***, as provided by ***ZPP***.

Exhaust pipe installations requiring additional length or bends will require increasing the I.D. off the pipe proportional to the length to reduce back pressure. Back pressure should not exceed ½ psig for engines below 5.7 liters and 1 psig for engines 6.5 liters and larger.

Ultimately, back pressure readings with suitable gauge will be the determining factor for all exhaust installations.

Summary

This document was created as a guide to assist in basic engine installation. For detailed specific engine information and guidelines, please refer to the specific engine ***Owner Operator Manual***, or contact a ***ZPP*** Representative at **(276)525-4760**, for additional installation assistance and materials.

ZPP application approval is required for every new product installation. This document does not relieve the ***OEM*** or customer from ***EPA*** or local regulations or restrictions. In case of doubt or uncertainty, please contact your ***ZPP*** Representative.

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