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## FLT LPG Powered Engine Operations

### Scope

This guidance provides information to assist in maintaining the operation of LPG powered engines fitted to Fork Lift Trucks (FLT); The general principles also apply to other LPG powered engines used in other applications e.g. grass cutters, but excluding road vehicles.

### Operation

Equipment must be operated in accordance with the instructions from the manufacturer. For units that do not have direct fuel injection this may include allowing the engine to reach a suitable operating temperature before being put under load.

### Maintenance

There needs to be a maintenance system in place for all engine systems, which in addition to the mechanical maintenance covers at least:

- LPG removable cylinder/fixed container;
- Cylinder/container restraints;
- Cylinder/container fill coupling, gauges and valves;
- Hose connections and assemblies; And where fitted:
- Fuel filter;
- Fuel injection system;
- Vapouriser;
- Carburettor system.

#### Removable cylinders/fixed containers

These need to be designed to an appropriate standard and when new have been dried out to prevent moisture entrapment/rust.

The maintenance of removable cylinders is the responsibility of the cylinder owner. Maintenance of a container fixed to the unit is the responsibility of the FLT owner/operator.

Some cylinders may be fitted with internal magnets in the cylinder to reduce the probability of ferrous particles passing into the engine. Others may be fitted with a valve assembly incorporating a filter.

## Hoses

Many types of hose, that may appear to be suitable for LPG use, are manufactured using plasticisers that will leach out when exposed to liquid phase LPG, these plasticisers can build up in the fuel system and cause malfunctioning of the engine. Therefore, it is essential that hose assemblies fitted to FLT's are suitable for use with liquid LPG and correctly installed.

- The assemblies are suitable for an operating pressure of not less than 25 bar;
- The hose lining components cannot leach out or deteriorate over time;
- The hose covering is resistant to oils;
- The assembly is kept away from heat. e.g. exhaust pipes, radiators etc;
- The assembly is not subject to tight bends or is twisted;
- The hose is kept away or protected from mechanical damage.

If there is any doubt if the correct standard of hose is being used then confirmation should be obtained from the supplier.

Hoses on the equipment used to fill the cylinder/container from a static installation have linings that cannot be affected by the action of liquid LPG.

## Filters

As with all types of vehicle fuel supplies the manufactures of the equipment are recommended to fit appropriate filters in the system before the engine. For units with vaporisers this should be between the container and the vaporiser. Some small bulk installations are also fitted with fine filters (e.g. 25µ micron) after the transfer pump.

## Fuel Standard

In the UK the fuel will be "Commercial Propane" that meet the requirements of British Standard 'BS 4250 Specification of commercial propane and commercial butane', the Standard mirrors or is more demanding than the international Standard ISO 9162 Petroleum products - Fuels (class F) — Liquefied Petroleum Gases - Specifications. The LPG used for engine fuel is identical to that used for heating and other applications, Liquid LPG when delivered does not contain a significant quantity of particles in suspension.

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