

LETTER OF THE LAW

ENGINEERING AND LEGISLATION WITH JOHN VARETIMIDIS

FUEL SYSTEMS

Modifications to the original fuel system of a production car vary depending on the application of the vehicle and the fuel pressure and flow required by the engine. This article will outline some of the minimum design, installation and fabrication requirements to be followed when deciding to modify the fuel system of your modified vehicle.

Some examples of modifications that do not require certification by an engineer would be the replacement of existing fuel lines, fuel filters and fuel pumps that do not alter the location or size of the existing fuel system components. Replacement components must be recommended as a 'direct replacement' to the original components and require no modification for fitment.

Replacing an existing fuel tank with a non-original fuel tank, fitting a surge tank, replacing the existing fuel pumps with larger-capacity fuel pumps and re-routing fuel lines require engineering certification.

Where an existing engine is replaced with a later-model engine that was originally designed to operate on 'unleaded fuel only', the fuel filler neck assembly must be modified to accept the smaller-diameter fuel inlet assembly and also be marked with an 'unleaded fuel only' label to be fitted adjacent to the filler assembly or marked on the filler cap.

The replacement of existing fuel lines requires any replacement lines to be suitable for use in automotive vehicles and designated for automotive fuels only.

Fuel lines must be adequately fastened and secured at regular intervals, with any push-on-type fittings further secured with appropriate hose clamps to ensure that the fuel is retained above the recommended pressure and to eliminate any fuel releasing under any circumstance. Fuel leaks over electrical or heated components can cause a severe risk and pose a fire hazard.

Fuel lines should be routed well clear of any existing exhaust components of turbochargers and also insulated with rubber grommets where they are passing through panels, bodywork and chassis members.

Replacement fuel tanks that were not fitted or available by the manufacturer must be engineer certified and it is

recommended you consult with an engineer before fitting any aftermarket fuel tanks.

The replacement fuel tank must be within the minimum ground clearance requirements and also fall within the recommended departure angle (refer to engineer for details). Any section of the replacement fuel tank that may fall within 200mm of ground level must be adequately protected with shielding or adjacent permanent vehicle components.

Any section of the fuel tank or fuel system components must lie within 100mm of the original permanent body work. Underbody clearance is very critical so that in the event of a vehicle reversing into a steep driveway of a deflation of the rear tyre/s when the vehicle is loaded, no part of the fuel tank or fuel system must come into contact with the road surface.

The mounting of the fuel tank must also be considered to ensure the anchor points are adequate, particularly when the replacement fuel tank is of a greater capacity of the original.

In most cases, a fuel filler inlet and cap assembly must be located outside the vehicle if the manufacturer has equipped the vehicle with an external fuel filler. The inlet must be sealed from the rest of the vehicle to ensure any fumes or leakages are retained and do not enter the passenger cabin area.

Vehicles equipped with emission control systems must have all original fuel tank evaporative controls refitted and correctly installed to prevent the release of any hydrocarbon emissions entering the atmosphere. This also refers to the charcoal canister, which should be upgraded in capacity when the replacement is significantly larger in capacity also.

Fabrication and welding of custom fuel tanks must be carefully considered to ensure the appropriate welding method is selected, suitable welding materials are used and all joints are prepared and sealed.

A recommended guide for suitable welding techniques may be found in Australian Standard AS/NZS 1554.1:2004 'Structural Steel Welding – Welding of Steel Structures'.

All replacement fasteners must be upgraded in size when larger-capacity fuel tanks are fitted and must be equivalent to an ISO grade 8.8 of SAE grade 5 fastener specification with self-locking nuts.

The abovementioned notes are only a guide and further information is available in the National Code of Practice (NCOP) or by contacting a consulting engineer. **SC**