

FOCUS ON | HOW TO BUILD A PETROL TANK TRACTOR

Petrol tankers are specially modified to mitigate the extra risks posed by their combustible load. In the UK, two sets of rules are imposed on their design. First is the European Agreement concerning the International Carriage of Dangerous Goods by Road, or ADR regulations, whose last iteration was published in January 2017.

New tractor chassis manufactured to be ADR-compliant in Europe, and imported to the UK, will require further modification before they can get to work. Partly, that is because in the UK, these general rules are seen through the prism of their UK interpretation, including older petroleum 'pet regs' - see link below. These rules offer derogations and exemptions from ADR requirements for carriers in a few special cases.

In addition to obeying the UK's version of ADR, fuel hauliers also need to comply with a second scheme: a voluntary code imposed by petrol suppliers to ensure that vehicles are compatible with terminals' loading rack systems. This Safe Loading Pass (SLP) requires an inspection by a qualified technician at an approved provider (see link below). It refers to and complements ADR standards and is based on the Energy Institute's Petroleum road tanker design and construction code of practice (not covered here: <https://is.gd/ufemex>).

To make a UK-legal tractor for a petrol tanker, then, UK



converters would need to hold a VCA type approval certificate for the particular base truck, according to ADR.

Examples of converters are Meller Flow Trans of Bradford - which holds Mercedes-Benz type approvals, and also works on other truck brands - and MAN Truck & Bus in Trafford Park, Manchester. The latter's SFC - special fitment centre - has a physical capacity of 16 vehicles at a time, and aims to convert 200 vehicles for ADR requirements, including petrol tankers, in 2018. The centre is certified to four type approvals, covering a multitude of models: TGS/X N3 three-axle tractors or rigid with leading and trailing axles, TGM N3 two-axle rigid and TGS N3 four-axle rigid trucks; approvals for the rest of the MAN range are expected to be obtained by mid-2019. New trucks modified in this manner retain the standard MAN warranty offered with new vehicles.

Modifications for petrol tanker-hauling trucks seem

to be essentially intended to reduce the risk that a fire might start, as well as providing extra means of safety should a blaze break out. ADR 2017 section 9.2 states: "Installation shall be designed, constructed and protected so it can't provoke unintended ignition or short circuit under normal conditions of use."

For example, almost all of the truck's electrics must be able to be switched off when the tanker is being filled at the terminal. This is done by a cut-out mounted near the battery in the supply lead, controlled by a master switch in the cab. (SLP tests require that the switch is labelled, and acts in three seconds, or up to 10 if extra green warning lights are fitted.) EU law requires that the truck's tachograph remains functional even during filling, to record drivers' working hours. So it must be able to operate safely in environments with potentially explosive environments (so

marked 'Ex'), and attached to a safe circuit. For this reason, SLP tests are carried out to confirm that the tachometer's power cable is dedicated and distinguishable from others.

ADR specifications also limit fire risk through various other electrical requirements. They include the use of fuses or automatic breakers for most circuits. Voltages are generally limited to 60V DC, 25V AC; higher voltages need to be galvanically isolated; those higher than 1.5kV need to be placed in an enclosed housing. Electrical cabling at the rear of the cab and on trailers needs to have extra protection: that might be for example using corrugated polyamide conduit, or multicore cables. SLP tests verify that the amount of electrical continuity of the chassis in two paths - between tractor chassis and drive axle, and between chassis and fifth wheel rubbing plate - is limited to 10 Ohm each. Similarly, batteries are required to have an insulating cover, have as short a lead as possible, and be located at least 1m from any loading adaptor.

ADR bodywork modifications generally provide heat shielding. Fire screens in fibreglass or aluminium panels mount to

the back of the cab and the chassis, and cover all of the engine and exhaust system (but not the battery box), separating the engine, the driver and a potential fuel leak (pictured, left). Exhaust system pipework running near the trailer must have at least 100mm clearance, or be fitted with an extra heat shield.

Factory-fit polymer mudwings - standalone wheel arches that bolt on to the chassis frame - are replaced with fire-retardant models, such as aluminium versions, on tractors' rear two axles. This job also involves rerouting cables and either reattaching the old lights or fitting new ones, as the rear light clusters are mounted on the wings; LEDs are becoming a popular retrofit option at MAN.

Another common bodywork adaptation is solid checkerplate sheets filling in over the back of the tractor chassis. They not only provide safe access, but also prevent any potential contact between fuel leaking out of the front tanker foot valve and hot drivetrain or exhaust parts. Sometimes MAN will move chassis-mounted tanks and other nearside equipment to make space for discharge controls, valves or pipework. Warning signs need to be mounted to the front of the

UNLOADING PUMPS

Another common modification to spirit tanker tractors carried out by MAN (about half of the time) is more common to other truck conversions: fitting of hydraulic power packs. In this case, the nearside chassis-mounted units power unloading pumps, via a pair of hydraulic hoses connected to the tank. MAN typically fits PTO-driven Gardner Denver units that include an integral oil tank.

A new custom feature to be fitted by MAN later this year is an engine run lock, which would allow the operator to turn on the engine, engage the PTO, leave the cab, shut and lock the cab door, and walk around to the nearside of the truck to dispense fuel. Without this modification, the driver would have to leave the cab unlocked, and therefore vulnerable to an opportunistic thief or troublemaker. It requires installing a specially made engine control unit.

cab, often in the grille, and also on the side of the tanker. Outside, petrol tankers also need to carry a shovel, a drain seal, a plastic collecting container and wheel chocks. Fire extinguishers are fitted, too: for 7.5-tonne trucks and above, a total of 12kg are required on the vehicle, including one 6kg unit.

In the cab, there are minor and not-so-minor changes. The cab sunroof needs to be either secured closed, or converted into an emergency escape hatch. Extra safety equipment needs to be carried, too. The list includes a glass hammer, a 2kg fire extinguisher within reach of a belted-in driver, eyewash and warning vests for each crew member. There are additional control switches to install, and labels to apply. Cigarette lighters are not allowed, and any battery-powered equipment needs to be fitted with an off switch, or a sleep mode if Ex-marked (excluding button-cell-powered devices). Night heaters require a lockable isolation

switch. Petrol picked up in the tread of work boots can degrade rubber floor mats, so MAN replaces them with coir.

These summarise most, but not all, of the modifications required to be ADR-compliant. Once finished, the truck must be inspected by an ADR authority before first use, and annually at specialist DVSA-approved dangerous goods truck testing stations, in addition to its statutory annual inspection. During that first year or so, the same truck will also need two other inspections, as the Safe Load Pass disc lasts only six months. Given the great danger of the load that they are carrying, it is perhaps comforting that these trucks are some of the most inspected on the road. **IE**

-Will Dalrymple

FURTHER INFORMATION

FPS Expo 2018, Liverpool, 18-19 April - <https://is.gd/bolifo>

UK carriage of dangerous goods guidance - <https://is.gd/quvupu>

Safe Loading Pass scheme - <https://is.gd/hucuya>

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