

Vehicle Finishing Units – Risks from Gross Leakage of Fuels

◆OC 803/58

Target Audience:

Factory Inspectors
FCG Specialist Inspectors (Fire and Exp)

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SUMMARY

1 This OC and attached Information Document (ID) revises and replaces FIC 803/45. The ID gives advice on precautions which should be taken to reduce the risk of explosions caused by leakage of fuel. The ID may be copied and given to interested persons outside HSE.

2 A detailed investigation of a petrol vapour explosion in a vehicle finishing unit at →¹ ←¹ and a concern to minimise unnecessary draining of petrol tanks, has prompted a revision of the ID.

3 Para 6(1) of the ID accompanying the original FIC required vehicle fuel tanks, among other things, to be "substantially empty" before vehicles enter drying ovens. The major hazard to be prevented is a gross leakage of fuel from, for example, joints in fuel lines if the fuel system is pressurised by, for example, leaving the petrol cap on, rather than petrol vapour from the open end of a fuel filler pipe. The concentration of vapour leaving a vehicle filler pipe will not, under normal operating conditions, approach the lower explosion limit by the time the vapour/air mixture reaches the hot walls of the heat exchanger in the vehicle preparation unit. Vapour from gross leakages of fuel, however, will not be sufficiently diluted by the same time.

4 The advice in the ID is therefore amended to read "reasonably empty, preferably about one quarter full" to discourage the unnecessary draining of fuel tanks, an operation which itself gives rise to serious hazards of fire and explosion.

5 Para 3 of the ID stated that explosion reliefs fitted to vehicle finishing units in accordance with GM(PM)25 *Vehicle Finishing Units: Fire and Explosion Hazards* (file 803) would be capable of relieving explosions of flammable vapours "... due to any spillage of fuel during the baking cycle". The experience of the → ←² explosion was that gross leakage of fuel would result in an explosion of such force that the unit is likely to be demolished and that explosion reliefs as recommended in GN(PM)25 would not offer safe relief.

6 Further, it is doubtful whether larger reliefs and/or stronger construction would prevent such demolition and the ID has been modified to point out that explosion relief in line with GN(PM)25 may cope with minor spillages but not "any spillage of vehicle fuel during the baking cycle".

Cancellation of instructions

7 FIC 803/45 - cancel and destroy.

ASI headings

Fire: motor vehicle repair: paint(s) - use of: vehicles

1 Exemption 15 – Statutory and other restrictions (Section 28 of the Health and Safety at Work etc Act 1974)

2 Exemption 15 – Statutory and other restrictions (Section 28 of the Health and Safety at Work etc Act 1974)

VEHICLE FINISHING UNITS - RISKS FROM GROSS LEAKAGE OF FUEL

- 1 This document contains internal guidance which has been made available to the public. The information may not be directly applicable in all circumstances and any queries should be directed to the appropriate enforcing authority.
- 2 This document provides advice on precautions which should be taken to reduce the risk of explosions other than those caused by paint vapours. It updated advice previously given in Information Document HSE 803/45.
- 3 Guidance Note PM 25 "Vehicle Finishing Units: Fire and Explosion Hazards" gives advice on basic safety precautions for vehicle finishing units and is intended to assist designers, manufacturers, importers and suppliers in achieving compliance with their duties under the Health and Safety at Work etc Act 1974, Section 6.
- 4 Explosion relief provided at units in accordance with the information within Guidance Note PM 25 should be capable of relieving the effects of an explosion arising from the ignition of flammable vapours evolved due to both the temperature increase of the paint solvents and to any minor spillage of vehicle fuel during the baking cycle.
- 5 Explosion reliefs and ventilation systems of such plant are not designed to deal with flammable vapours arising from a gross leakage of liquid fuel (whether petrol, LPG or diesel oil).
- 6 Gross leakage of fuel can occur when fuel systems are deliberately disconnected (eg because the engine or an element of the fuel system has been removed) or because of a sudden failure of an element of the fuel system (eg due to an increase of the internal pressure within a system itself). As operating temperatures in the unit increase, the need for precautions to prevent gross leakage becomes more important.
- 7 The main precautions which should be taken to prevent the build up of vapour pressure and gross petrol leakage are:
 - (1) **REMOVING COMPLETELY FILLER CAPS ON ALL VEHICLES BEFORE THEY ARE HEATED IN THE UNIT.** In addition, flaps covering filler caps and filling cavities should be fully opened before the over doors are closed and the heating cycle is started. This should prevent the build-up of vapour pressure in the fuel tank and fuel lines. The common kinds of ventilation systems provided with such plant will remove the quantities of petrol vapour which are emitted through open fuel lines and pipes. The placing of the removed filler cap on the dashboard of the same vehicle provides a basis for a simple visual check that the correct procedure has been followed;

- (2) ENSURING VEHICLES' FUEL TANKS ARE REASONABLY EMPTY (PREFERABLY ABOUT ONE QUARTER FULL) BEFORE THEY ENTER THE OVEN; and
- (3) CHECKING THE INTEGRITY OF FUEL LINES, PARTICULARLY AT JOINTS (The fuel lines, if non-metallic, should be able to withstand the temperatures likely to be encountered in the unit).

8 VEHICLES WHICH HAVE HAD ENGINES REMOVED SO LEAVING OPEN-ENDED FUEL PIPES FROM FUEL TANKS IN SITU SHOULD NOT BE TREATED IN A VEHICLE FINISHING UNIT OVEN. Under these circumstances there is an increased risk of escape of liquid petrol.

LPG FUELLED VEHICLES

9 LPG cylinders should be removed from the vehicle before it is put through the drying/baking unit. (See Guidance Note PM 25, para 4).

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