

## **Proposed Amendments to Directive 96/79/EC (Frontal Impact) covering gaseous fuelled vehicles.**

Annex II Technical Requirements

3.2. Specifications

3.2.6 renumber as 3.2.6.1

Add the following:

"3.2.6.2 In the case of a vehicle propelled by LPG, the fuel system of the vehicle shall comply with the following requirements:

- (a) there shall be no more than slight leakage of any test-fluid from the fuel system during any period commencing at the impact of the vehicle and ending one-half hour from the time of impact;
- (b) the temperature-corrected pressure in the fuel system shall not decrease to less than 95 per cent of that required at the start of the test during any period of the test extending to one-half hour from the time of impact; and
- (c) the fuel container shall not become detached from the vehicle at any attachment point.

3.2.6.3 In the case of a vehicle propelled by CNG or CGH<sub>2</sub>, the fuel system of the vehicle shall comply with the following requirements:

- (a) the fuel container of the vehicle shall not become detached from the vehicle at any attachment point; and
- (b) For all vehicles, the pressure drop in the high pressure portion of the fuel system, expressed in kilopascals (kPa), in any fixed or moving barrier crash from vehicle impact through the 60 minute period following the impact shall not exceed:

- (1) 106,2 kPa or
- (2)  $895 \times (T/V_{fs})$   
whichever is higher

where T is the average temperature of the test gas in Kelvin, stabilized to ambient temperature before testing, where average temperature (T) is calculated by measuring ambient temperature at the start of the test time and then every 15 minutes until the test time of 60 minutes is complete; the sum of the ambient temperatures is then divided by five to yield the average temperature (T); and  
where  $V_{fs}$  is the internal volume (in liters) of the fuel container and the fuel lines up to the first pressure regulator.

**3.2.6.4. In the case of a vehicle propelled by LH<sub>2</sub>, the fuel system of the vehicle shall comply with the following requirements:**

- (a) the fuel container of the vehicle shall not become detached from the vehicle at any attachment point; and**
- (b) the fuel container must be tight, i.e. bubble free if using detecting spray, between the manual or automatic shut off valve of the refueling line and the automatic valve of the H<sub>2</sub> fuel supply line; no uncontrolled release of the test fluid is allowed.**

## Appendix I

### TESTPROCEDURE

1.4.2.2.2 For LPG or LPG bi-fuel vehicles, each LPG fuel storage container must be filled with Stoddard Solvent (or other suitable test fluid) and pressurized with nitrogen N<sub>2</sub> at 1000 kPa, as measured when the tank temperature is stabilized to ambient temperature.

1.4.2.2.2.1 After each fuel storage container is filled as in 1.4.2.2.2, the fuel system other than each fuel storage container is filled with Nitrogen, N<sub>2</sub>, to normal operating pressures. All manual shutoff valves are to be in the open position.

1.4.2.2.2.2 If the vehicle has an electrically driven fuel pump that normally runs when the vehicle's electrical system is activated, it is operating at the time of the barrier crash. If the vehicle has any high pressure electric shutoff valve that is normally open when the electrical system is activated, it is open at the time of the barrier crash. Furthermore, if any electric shutoff valve prevents sensing of system pressure by the pressure transducer when closed, it must be open for both the initial pressure measurement and the pressure measurement 60 minutes after the vehicle ceases motion from impact. Any valve shall be open for a period of one minute to equalize the system pressure.

1.4.2.2.3 For CNG, bi-fuel CNG or CGH<sub>2</sub> vehicles, each CNG or CGH<sub>2</sub> fuel storage container is filled to 100 percent of service pressure with nitrogen N<sub>2</sub>, as measured when the tank temperature is stabilized to ambient temperature.

1.4.2.2.3.1 After each fuel storage container is filled as specified in 1.4.2.2.3, the fuel system other than each fuel storage container is filled with nitrogen, N<sub>2</sub>, to normal operating pressures. All manual shutoff valves are to be in the open position.

1.4.2.2.3.2 If the vehicle has any high pressure electric shutoff valve that is normally open when the electrical system is activated, it must be open at the time of the barrier crash. Furthermore, if any electric shutoff valve prevents sensing of system pressure by the pressure transducer when closed, it must be open for both the initial pressure measurement and the pressure measurement 60 minutes after the vehicle ceases motion from impact. Any valve shall be open for a period of one minute to equalize the system pressure.

**1.4.2.2.4 For LH<sub>2</sub> vehicles, each LH<sub>2</sub> fuel storage container is filled with liquid nitrogen LN<sub>2</sub> to the mass equivalent of the maximum quantity of LH<sub>2</sub> that may be contained in the inner vessel. At the beginning of the test the equilibrium pressure in the storage tank is the normal operating pressure.**

**1.4.2.2.4.1 After each fuel storage container is filled as specified in 1.4.2.2.4, the fuel system other than each fuel storage container is filled with nitrogen N<sub>2</sub> to normal operating pressures. All manual shutoff valves are to be in the open position.**

**1.4.2.2.4.2 If the vehicle has any high pressure electric shutoff valve that is normally open when the electrical system is activated, it must be open at the time of the barrier crash.**