

## Economic Commission for Europe

### Inland Transport Committee

#### Working Party on the Transport of Dangerous Goods

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##### Any other business

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### Risks from Euro VI Exhaust Systems in ATEX zoned Areas

#### Transmitted by the AEGPL

#### Introduction

This is for information of the participants, on an identified issue related to safety risks associated with the use of Euro 6 engines in HG and other vehicles operating in ATEX zoned areas.

1. Euro 6 is the latest diesel engine emission legislations being driven by the European Commission, which came into force for commercial vehicles in January 2014.

Euro Standard	Year Enforced	NOx	PM
Euro 1	1993	8.00	0.36
Euro 2	1996	7.00	0.15
Euro 3	2001	5.00	0.10
Euro 4	2006	3.50	0.02
Euro 5	2009	2.00	0.02
Euro 6	2014	0.46	0.01

2. While driving, Euro 6 Modified exhaust systems break down emissions chemically then the exhaust gases are led through the particulate filter, which is integrated into the exhaust piping. The exhaust is cleaned and the particles remain in the filter. In doing so, the filter is loaded with soot and the backpressure in the exhaust is increased.
3. When the maximum allowed backpressure is reached (mostly 150 mbar) the filter must be regenerated; in order to achieve this the soot must be ignited which requires temperatures above 500°C (temperatures that can ignite a flammable atmosphere)
4. There are three regeneration processes that can occur
  - Passive regeneration – The catalytic coating of the exhaust system is the most common example of how a passive system works. The regeneration takes place without any active interference to raise the exhaust gas temperature provided the exhaust is running at its working temperature.

- Active regeneration – The vehicle is not at its normal working temperature and the exhaust back pressure tells it that it needs to do an active (automatic) regeneration and the vehicle speed is above the speed set by the manufacturer, e.g. 30 kph. Active regeneration involves injecting diesel fuel into the exhaust system which burns away accumulated soot. If an active regeneration is in progress and the truck speed drops below the set speed, it may automatically stop the process.
- Forced regeneration – A message on the dash tells the driver that a regeneration is needed. The truck needs to be stationary with the handbrake on, the driver then needs to press the regenerate button on the dashboard. This button will not work unless the system detects that regeneration is necessary

### **Risk in ATEX Zones where LPG vapour may be present**

5. The auto ignition temperatures of propane and butane are approximately 470°C and 400°C respectively and therefore the presence of a hot exhaust pipe temperature of 500°C can present an ignition risk if there is a flammable atmosphere present.
6. Engineering solutions or an additional switch is required to prevent active regeneration from taking place and this should be put in the safe position while in a location where a flammable atmosphere may occur and for road tankers during loading and unloading operations.

### **Secondary Risk**

7. As the temperature of the exhaust gases can be high, forced regeneration should not take place without providing a suitable exclusion zone around the exhaust outlet due to the risk of burns. Careful selection of the parking location is therefore necessary as the forced regeneration may take around 50 minutes to complete, the actual time taken may vary with each exhaust system used and this time and the required exclusion zone should be established with reference to the manufacturer and the driver advised.

### **Actions that have been recommended so far to AEGPL members**

#### **Immediate**

8. Identify and evaluate any vehicles that have a Euro 6 compliant exhaust system as above
  - Trucks/heavy commercial vehicles – came into force from January 2014
  - Cars and light commercial vehicles – Came into force September 2015
9. It is recommended that all such vehicles are adequately marked in a way that is clearly visible to operational staff in sites that have ATEX zoned areas if these vehicles are required to enter any of these ATEX zoned areas.

#### **Subsequently**

10. Provide instructions and incorporate suitable training for relevant drivers and relevant staff into both initial and refresher training programmes.
11. Incorporate a check for Euro 6 exhaust systems in purchasing process – this affects all vehicles and may include also some fork lift trucks.