

## Legislation on vehicles and fuels in EU

Emission requirements for light road vehicles have existed in the EU since the early 1970s, while the first requirements for heavy vehicles came in at the end of the 1980s. They have been tightened up several times over the years, a process that is still going on. The legislation has also been extended to include non-road vehicles and machinery, as well as two- and three-wheeled vehicles.

The current exhaust emission requirements regulate four groups of compounds: **nitrogen oxides** (NO<sub>x</sub>), **hydrocarbons** (HC), **carbon monoxide** (CO) and **particulate matter** (PM). Emissions of the greenhouse gas carbon dioxide are not currently regulated for any type of vehicle.

### Light vehicles (cars and light commercial vehicles)

The light category of vehicles covers road vehicles under 3.5 tonnes, i.e. both passenger cars and light commercial vehicles.

Under the Euro 4 standards (that took effect in 2005) diesel vehicles are allowed to emit around three times more nitrogen oxides than petrol vehicles.

Emissions of particulates from petrol vehicles are not regulated since these are very low compared to emissions from diesel engines. Some direct-injection petrol engines can, however, emit almost the same level of particulates as a diesel engine.

A new directive, agreed in December 2006, will set Euro 5 standards for fine particles, hydrocarbons and nitrogen oxides (NO<sub>x</sub>) from 2009 for new models (2010 for all vehicles), and tougher Euro 6 standards for NO<sub>x</sub> only from 2014 for new models (2015 for all vehicles).

As regards NO<sub>x</sub>, the current Euro 4 standard for diesel cars is 250 mg/km. Euro 5 would tighten this to 180, and Euro 6 to 80 mg by 2014. The Euro 6 standards might force application of NO<sub>x</sub> after-treatment technology, such as lean NO<sub>x</sub> traps (LNT) or Selective Catalytic Reduction (SCR).

The level for particulates (PM) is set to 5 mg/km, for both diesel and petrol cars (both Euro 5 and 6). The new standard will cut permitted PM emissions from new diesel cars by 80 per cent (25 mg/km today). This is very likely to force fleetwide application of diesel particle filters (DPFs).

**The new Euro standards for nitrogen oxides (NO<sub>x</sub>) and particulates (PM) from passenger cars.**  
Emissions in mg/km. There are also standards for hydrocarbons, but these are not included in the table.

	<b>Euro 4</b>	<b>Euro 5</b>	<b>Euro 6</b>
NO <sub>x</sub> – diesel cars	250	180	80
NO <sub>x</sub> – petrol cars	80	60	60
PM – all cars	25 <sup>1</sup>	5	5

<sup>1</sup> Diesel cars only.

### Heavy duty road vehicles (lorries and buses)

A directive (1999/96/EC) was adopted in 1999 giving emission standards for Euro III (2000), IV (2005) and V (2008).

Euro V differs from Euro IV in its stricter emission requirement for nitrogen oxides. The Euro V requirements are still indicative. According to the Commission's review in December 2003 it is however perfectly possible to achieve these requirements.

**EU emission standards for heavy road vehicles.** There are also standards for carbon monoxide and special standards for methane for gas-driven vehicles, but these are not included in the table.

	<b>NO<sub>x</sub></b> <b>(g/kWh)</b>	<b>HC</b> <b>(g/kWh)</b>	<b>PM</b> <b>(mg/kWh)</b>
Euro I (1992-93)	9.0	1.23	400
Euro II 1995-96)	7.0	1.1	150
Euro III (2000)	5.0 <sup>1</sup>	0.66 <sup>2</sup>	100/160 <sup>3</sup>
Euro IV (2005/06)	3.5 <sup>1</sup>	0.46 <sup>2</sup>	20/30 <sup>3</sup>
Euro V (2008/09)	2.0 <sup>1</sup>	0.46 <sup>2</sup>	20/30 <sup>3</sup>

<sup>1</sup> Both ESC and ETC test cycle.

<sup>2</sup> ESC test cycle only.

<sup>3</sup> ESC and ETC test cycle respectively.

A proposal for Euro VI standards for heavy vehicles is anticipated late 2007. In a public consultation launched in July 2007 the Commission has presented four scenarios of the regulatory approach for coming Euro VI standard, details can be seen here.

### **Non-road machinery**

The file of Non-Road Mobile Machinery (NRMM) currently contains three directives that regulate exhaust emissions from and test procedure for different types of engines.

The mother directive (97/68/EC) covers diesel fuelled engines used in excavators, bulldozers, front loaders, back loaders, compressors, etc. The second directive (2002/88/EC) covers spark ignited engines up to 18 kW for engines installed in handheld and non-handheld equipment. The third directive (2004/26/EC) covers diesel fuelled engines from 19 to 560 kW for common NRMM and regulates the emission in three further stages. The directive also includes railcars and locomotives and inland waterway vessels, and for the two latter categories there are no upper limits concerning engine power. The different stages in the third directive are as follows:

- Stage III A covers engines from 19 to 560 kW including constant speed engines, railcars, locomotives and inland waterway vessels – from January 2006.
- Stage III B covers engines from 37 to 560 kW including, railcars and locomotives – from January 2011.
- Stage IV covers engines between 56 and 560 kW – from January 2014.

The final Stage IV requirements closely match the so-called US Tier 4 standards adopted by the US EPA.

A review of the EU Stage IV requirements is planned, however, at the end of 2007, to consider some issues that have been highlighted, as further stages for inland waterway vessels, flexibilities, in-use-compliance, durability testing, preventing cycle beating, and cycle by-pass at testing, further exemptions etc.

### **Fuels**

The quality of fuels, especially the sulphur content, is important to regulate in order to achieve low emissions from vehicles. Directive 2003/17/EC prescribes 50 ppm as maximum sulphur contents for diesel and petrol. As of 2009, the figure will be lowered to 10 ppm.

On 31 January 2007, the European Commission proposed new standards for transport fuels that will reduce their contribution to climate change and air pollution, including through greater use of biofuels. It is proposed that from 1 January 2009 all diesel fuel marketed will have a maximum sulphur content 10 ppm. From the same date, the maximum permitted content of polyaromatic hydrocarbons (PAHs) in diesel will be reduced by one-third.

The permitted sulphur content of gasoil for use by non-road machinery and inland waterway barges will also be cut. This too will reduce emissions of fine particles and allow the introduction of more advanced engines and emission control equipment.

The EU has also decided on targets for the use of renewable fuels in the Union. Directive 2003/30/EC requires each country to ensure that biofuels will have replaced 2 per cent of diesel and petrol by December 2005, and 5.75 per cent by December 2010. Exemption may be granted in cases where there is little potential for producing biofuel, or if it is already being used for other purposes.

According to the Commissions proposal from 31 January 2007, an obligation should be introduced for fuel suppliers to reduce the greenhouse gas emissions that their fuels cause over their life-cycle, ie when they are refined, transported and used. From 2011, suppliers would have to reduce emissions per unit of energy by 1% a year from 2010 levels. By 2020, this would result in a 10% emission cut.

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