**Car emissions testing in the UK explained**

**What is emissions testing?**

Under EU law, all new cars must have their air quality emissions, including carbon monoxide, particulate matter, hydrocarbons and nitrogen oxides, tested to ensure they meet the latest standards. The latest standard, introduced in 2015, is Euro 6, and cars cannot be sold unless they meet it.

**Why has the UK government conducted its own separate emissions tests?**

Following the VW emissions testing issue in the US in September 2015, the UK government, along with some other EU member states, announced it would conduct its own tests of cars in use to confirm that similar activity was not undertaken here.

**What did the government testing involve?**

The tests, undertaken by the Department for Transport, involved ‘spot checks’ of cars from various different brands. These randomly selected used cars were tested first in a lab on the current official NEDC test cycle and then on a second undisclosed cycle. They were also tested outside on a test-track in ‘real world’ conditions using Portable Emissions Measurement equipment.

**What do the results of these government tests show?**

The results show that the vehicles tested met the legal requirements. They also confirm the urgent need for reform of the current EU testing regime. For repeatability, all testing currently takes place in a lab. On the road, cars are subject to a huge range of influences: load, traffic conditions, driving style, temperature and electrical load (equipment must be switched off for the test). Since the test was introduced some 20 years ago, technology has progressed but the regulation has not.

**What does the current official testing process involve?**

The test is done in a laboratory under controlled conditions specified by the regulation to ensure consistency and comparability from one car to another. The car is put onto a ‘rolling road’ and fitted with emissions measuring equipment. It performs a standardised drive cycle called the New European Drive Cycle (NEDC), which has set speeds, acceleration and deceleration levels, and replicates different driving conditions.

**What are the conditions of the current official test?**

The test is carried out in a controlled temperature of 20-30 degrees centigrade. All components must be present and cannot be tampered with. For example, the alternator belt must be intact and the brakes must function fully. The vehicle will be checked to ensure it has the same tyre pressures, fluid levels and components as it would have on the road.

**Who governs the current test?**

The EU test operates under strict conditions in a government-approved test facility, and is witnessed by a government-appointed independent approval agency. In the UK, this is the Vehicle Certification Agency (VCA), which is responsible to the Department for Transport (DfT).

**Are the test results published?**

For air quality emissions, the lab results are used in a pass/fail test and the results are published on the VCA website. If the car meets the EU limits, it passes and is Euro 6 certified. If it fails, it can’t be sold. CO2 emissions are treated slightly differently – and the results for these (and fuel consumption) must, by law, be included in all advertising of the vehicle. This enables consumers to make reliable comparisons between cars regarding fuel economy, as well as determining how much VED and company car tax, etc they will pay.

**Are there plans to change the official test?**

Yes. The official NEDC (New European Drive Cycle) laboratory test dates back to 1996 and has its roots in the 1980s. It will be replaced in 2017 by a new lab test and, for regulated emissions such as Particulates and NOx, supplemented for the first time by on-road testing.

**What will these new tests involve?**

The new lab test is called the Worldwide Harmonised Light Vehicles Test Procedure (WLTP). It will offer the same scientific repeatability as the outgoing NEDC, but the cycle the car must perform will be much more representative of on-road driving conditions, with a wider range of temperatures, speeds and other factors.

For regulated emissions such as Particulates and NOx, the WLTP will be validated by a new on-road test called Real Driving Emissions (RDE). This will effectively make sure the vehicle’s lab test performance is maintained on the road. RDE will work by fitting equipment called a Portable Emissions Measurement System (PEMS) to the vehicle and taking emissions measurements during driving on real roads.

The vehicle will only be certified for sale if it delivers emissions within the set lab limits on the WLTP, and then achieves within a certain tolerance of those limits in the RDE test.

**When will the new tests happen?**

The WLTP and RDE tests will be progressively introduced from 2017.

**If on-road testing is so much more accurate, why isn’t it used now?**

Until now, the precision equipment needed to test emissions accurately and consistently in the variable conditions that exist outside of the lab hasn’t been available. However, the development of new Portable Emissions Measuring technology now makes this possible. From 2017, all car models newly approved for sale in Europe will be put through their paces on the road as well as in the lab, giving drivers more confidence in their car’s real world emissions performance.

**Glossary of terms**

**CO2 (carbon dioxide)**

When fuels such as petrol and diesel are burned in the engine, carbon dioxide (CO2) is produced and released into the atmosphere. CO2 is believed to be a major contributor to global warming so vehicle makers have been set tough EU limits to meet by 2020 – 95g/km.

**Conformity Factor (CF)**

A conformity factor is the emissions limit that applies to on-road emissions testing, due to start in 2017. It is set slightly higher than the lab-test limit to allow a margin for error within the functioning of the very sensitive testing equipment involved. It also allows a tolerance for extreme driving conditions encountered rarely by most motorists – such as below freezing temperatures and excessive speeds of up to 100mph at very high altitudes of up to 1300 metres – the equivalent of driving at the summit of Ben Nevis.

**DPF (diesel particulate filter)**

A diesel particulate filter is fitted to the exhaust of all Euro 5 and Euro 6 cars. It traps 99% of all particulates before they leave the tailpipe, virtually eliminating emissions of particulate matter compared with older cars.

**EGR (exhaust gas recirculation)**

EGR is a critical technology used to reduce the levels of NOx emitted by the engine. It involves recirculating some exhaust gas back into the engine combustion chamber. This reduces the amount of oxygen, and lowers combustion temperature. Less oxygen and a lower combustion temperature reduces the amount of NOx formed.

**Euro 6**

Euro 6 is the sixth air quality emissions standard for new vehicles sold in Europe. The EC has enforced Euro standards since 1993. Each successive standard has been tougher in its requirements, ensuring that every new generation of car uses the latest, cleanest engine and exhaust technology available.

**LNT (lean NOx trap)**

A lean NOx trap or catalyst is an exhaust after-treatment technology, which reduces the emissions of NOx from the tailpipe (see below). It captures NOx and neutralises it in the exhaust system.

**NEDC (New European Driving Cycle)**

The NEDC is the EU’s official test of new cars’ air quality and CO2 emissions, and it has been in place since 1996. It is a laboratory test, which operates in strictly controlled conditions and is monitored by a government-appointed approval agency. In the UK, this is the Vehicle Certification Agency (VCA).

**NOx**

NOx refers to nitrogen oxides or oxides of nitrogen that form when fuels are burned at high temperatures, as in the engine combustion process.

**Particulate matter (PM)**

Particulate matter, commonly known as soot, is a waste material of combustion. Thanks to a diesel particulate filter (DPF) fitted to Euro 5 and Euro 6 diesel cars that captures 99% exhaust particulates, this pollutant is all but eliminated. These cars emit the equivalent of a single grain of sand in PM each kilometre.

**PEMS**

PEMS, or portable emissions measurement system, is a sophisticated mobile laboratory in a box, which is fitted to the car and analyses tailpipe emissions while the vehicle is driven on the road or a test track.

**Real World**

Real world refers to conditions that affect a vehicle’s performance when it is being driven on the road, as opposed to being tested in a lab. Real world conditions are infinitely variable, making reliable and repeatable testing of emissions extremely difficult.

**RDE**

RDE stands for Real Driving Emissions and refers to the emissions that a car produces on the road while following a set procedure, rather than in a laboratory environment. On-road emissions can be affected by many different factors, including car and traffic conditions, temperature, weather, road surface and gradient, vehicle load and driving style.

**SCR**

Selective catalytic reduction (SCR) is a highly effective emissions reducing technology used in modern diesel vehicles. This specialist catalytic converter injects a urea based additive, or diesel exhaust fluid that’s often called AdBlue, into the exhaust to convert NOx into harmless nitrogen and water.

**Type Approval**

Type Approval is the official EU process new cars must pass before they can be certified for sale. It applies to many systems - emissions and safety. Cars must pass the relevant regulated tests before they are allowed to be put on the market. The VCA is the government-appointed Type Approval authority in the UK.

**WLTP (Worldwide harmonised Light vehicles Test Procedure)**

WLTP is a new lab-based test cycle, set to replace the NEDC in 2017. It is much more representative of
on-road driving, with a wider range of temperatures and speeds. It will also cater for electricity intensive technologies such as air con and heated seats, which must currently be switched off during testing under
the NEDC.

**ENDS**