VOLVO

Press Release

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Volvo meets world's toughest emission standards

A new engine now in production at Volvo Car Corporation (VCC) complies with the PZEV requirements of the California Air Resources Board (CARB), which operates the toughest emission control standards in the world. This has been achieved by means of a new method of heating the catalytic converter when starting from cold and by reducing evaporative emissions to zero.

In addition to the PZEV engine in production, several more are under development.

The V70 and S60 with the normally-aspirated, five-cylinder petrol engine are the Volvo models equipped with PZEV technology. They will be available on the Californian market only.

Development of the Volvo PZEV was related to three basic aspects:

Tail pipe emissions – involving cold-start emissions (for which the development team won the 2002 Henry Ford Technology Award), new catalytic converters and a new engine management system.

Evaporative emissions – involving hydrocarbon evaporation from the entire vehicle, but focusing mainly on the fuel system, including the fuel tank.

Durability criteria – to guarantee full purification performance for 15 years or 240,000 kilometres.

Cold starting

At least 90% of all emissions from a car are emitted from the exhaust pipe within the first minute of starting. Once the catalytic converter is hot, the emissions basically drop to zero. Using this technology, the quantities of hydrocarbons and nitrogen oxides emitted are actually lower than those present in the intake air. In other words, the car actually purifies the air of these substances!

Volvo engineers have developed a new method of cold-starting using a smart application of existing technology. The key element is VVT (Variable Valve Timing), which enables the car to be started with excess air – in other words, with a lean mixture, or 'negative choke'. This enables large quantities of air to be heated, bringing the catalytic converter to working temperature very quickly, while limiting the engine emissions to a minimum. New software has also been developed to control the starting sequence with a high degree of precision.

The first of the car's two converters is installed close to the engine, immediately downstream of the exhaust manifold. This also contributes to rapid activation of the unit.

Volvo's new cold-start technology has enabled exhaust emissions to be reduced significantly without compromising either performance or fuel consumption.

Evaporation

Volvo's engineers have also made significant advances in the area of evaporation. Evaporative emissions are measured by subjecting a car to a specified temperature cycle in a sealed

chamber for a specified period. Hydrocarbons evaporate not only from the fuel system, but also from the tyres, body and A/C system. As a result of Volvo's development work, evaporation from the Volvo PZEV has been reduced to almost zero.

All components are manufactured to ensure long durability in view of the length of the guarantee. VCC has been conducting comprehensive, accelerated endurance tests to assure the operation of the complete emission purification system for as long as 15 years or 150,000 miles (240,000 kilometres).

Valuable spin-off

"Apart from the exciting challenge of developing the systems which we have now introduced, the project has generated valuable technical spin-off," says Sten Sjöström, project manager responsible for new emission control concepts at VCC.

"We can also apply the experience gained to other Volvo models and in other markets where the regulations are less strict. In this way, we will be able to produce cleaner cars all over the world to a reasonable cost."

Background

From next year on, a specified percentage of cars sold in California must basically be zero-emission vehicles, with the exception of carbon dioxide. Although the legislators first intended that these should be electric cars (i.e. ZEVs, or Zero Emission Vehicles), they subsequently decided to permit other technologies – such as 'ordinary' petrol engines, hybrids and natural gas – provided that the emission levels are as low as those of electric cars, including production of the electricity. These cars are described as Partial Zero Emission Vehicles, or PZEVs.

Emissions of toxic hydrocarbons from our PZEV have been reduced to less than a thousandth of the levels from cars produced 30 years ago.

The team developing the Volvo PZEV-technology has won the Henry Ford Technology Award.

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