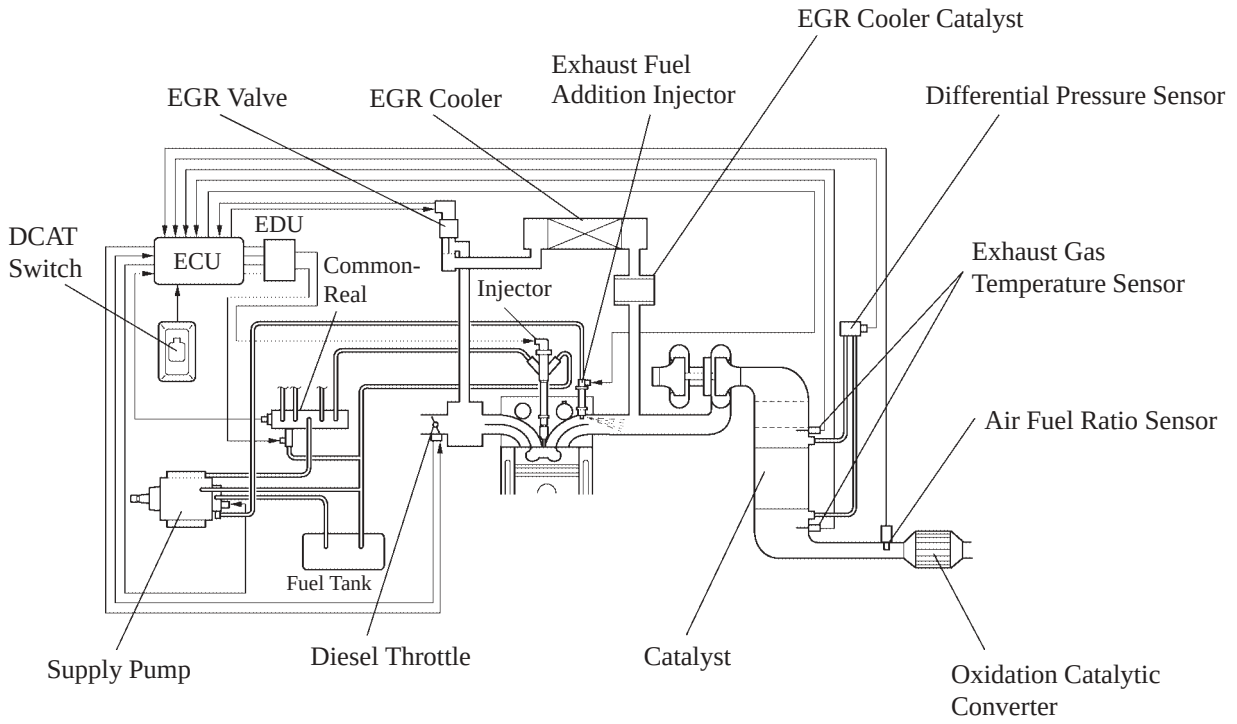
2. D-CAT System

"D-CAT (Diesel Clean Advanced Technology)" is a concept that is used for the technology that comprehensively controls the engine (including the catalyst, combustion, and fuel injection systems) for the purpose of simultaneously reducing PM (Particulate Matter) and NOx (Nitric Oxide), which are emitted by diesel engines.

DPNR is one of the newest system in D-CAT Concept.

▶ System Diaphragm ◀



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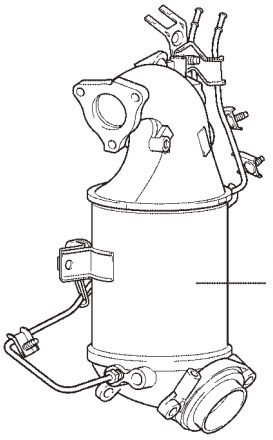
- A low-temperature diesel combustion system, which reduces NOx emissions by lowering the temperature of the combustion, has been adopted.
- An exhaust fuel addition injector has been added to the exhaust manifold. This injector supplies additional fuel into the exhaust manifold for the purpose of reducing NOx that is adsorbed in the DPNR catalyst, recovering PM, and for sulphur poison recovery.
- The 1CD-FTV engine with D-CAT uses the same oxidation catalytic converter as the 1CD-FTV engine without D-CAT in order to reduce the HC and CO in the exhaust gases.

DPNR (Diesel Particulate - NOx Reduction) catalyst

The DPNR catalyst simultaneously reduces PM and NOx, in addition to reducing HC and CO as in the oxidation catalyst.

- The base material is shaped like a bunch of pipes with inlets and outlets that are plugged alternately. The surface of the base material is coated with an adsorption-reduction type catalyst.
- A new, wall-flow type ceramic base material has been adopted. The fine PM elements become adsorbed in this material as the exhaust gases flow through the small holes in the wall.



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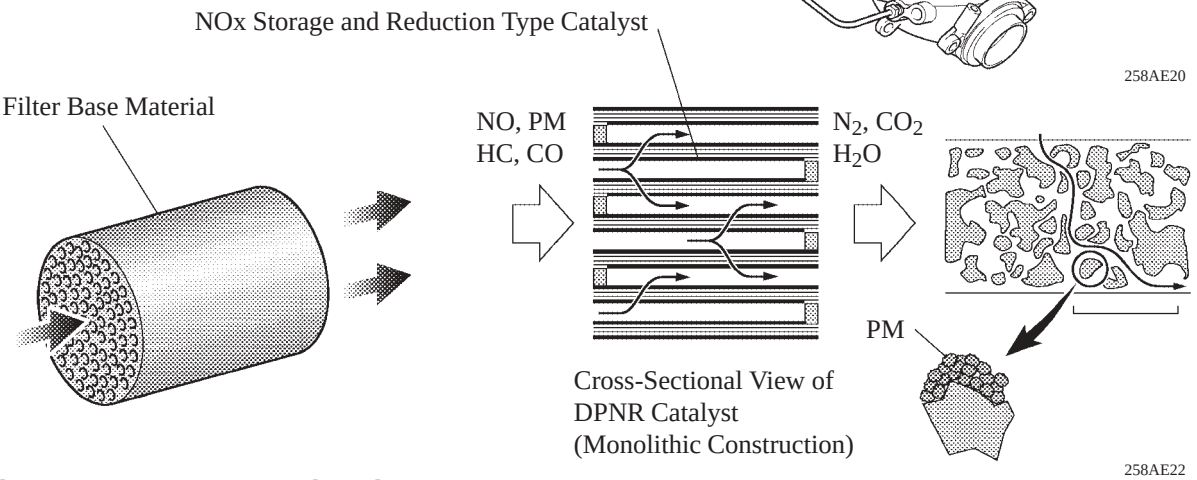

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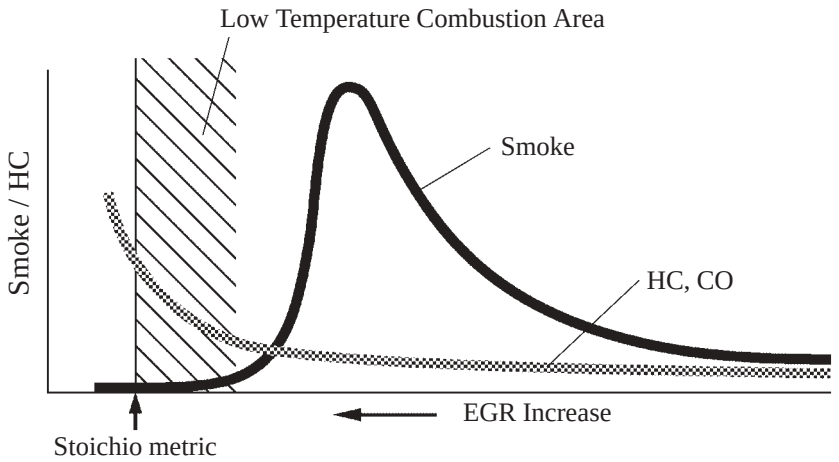
Low-temperature combustion

- In the conventional diesel engine, increasing the EGR gas decreases the amount of oxygen, which leads to increased smoke emission. However, the low-temperature combustion has adopted a highly efficient EGR system and a highly precise fuel injection timing control in order to further increase the EGR gas and make the air-fuel ratio even richer. As a result, the ambient combustion temperature decreases, which rapidly reduces the amount of smoke emission.
- The reduction of the ambient combustion temperature also reduces NOx and combustion noise. On the other hand, the amount of CO and HC emissions increases. These CO and HC emissions and the large amount of EGR gas cause the temperature of the catalyst to rise in order to ensure the proper catalyst temperature while the vehicle operates under low-load conditions.



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Exhaust Fuel Addition System

- An exhaust fuel addition injector has been installed on the No. 4 exhaust port of the cylinder head. This injector supplies additional fuel into the No. 4 exhaust port for the purpose of realizing fuel enrichment (in order to reduce NOx), and maintains the proper catalyst temperature for the purpose of PM (Particulate Matter) recovery and sulphur poison recovery.
- The feed pump portion of the common-rail supply pump supplies fuel to this injector.