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May 5, 2008

Ethanol technical paper looks at safer fuel vapor recovery testing methods

Vehicle fuel vapor recovery (EVAP) system leak-testing methods using shop air, like some non OEM-approved smoke machines, present an explosive risk in FlexFuel vehicles containing E85 Fuel (85 percent ethanol), according to a technical paper recently published by SAE International (Society of Automotive Engineers).

This amplifies the finding of a paper published by SAE last year about the flammability risk of the same EVAP testing methods on fuel tanks with gasoline.

Shop air, and the air we breathe, both contain about 21 percent oxygen by volume, well above the 11 percent needed to create a flammable mixture in an ethanol fuel tank.

Alcohol molecules in E85 already contain more oxygen than in gasoline hydrocarbons, according to the report. The fuel tank's vapor space can quickly become flammable when more air is added as the smoke carrier. This added air pushes the oxygen levels to potentially explosive ranges, the report adds.

If an external source ignites the fuel vapor at a leak, it can flash back into the oxygen-rich tank with dangerous consequences. In normal vehicle operation there's no risk of ignition. But during in-bay leak-testing, broken or missing hoses and open fuel caps can create an ignition path. Using an inert gas like nitrogen as the smoke carrier inexpensively eliminates this fire risk.

Virtually every automaker today strongly recommends or requires nitrogen for EVAP leak testing. Nitrogen-based Diagnostic Smoke® technology is the OEM industry standard for both ethanol and gasoline EVAP testing, according to the report.

STAR EnviroTech promotes a "test safely" approach in its OEM-approved EVAP smoke technology by designing it to quickly switch from nitrogen for EVAP testing to shop air for non-EVAP leaks.

The 2008 Ethanol Paper is available at www.sae.org/technical/papers/2008-01-0554 [http://www.sae.org/technical/papers/2008-01-0554], and the 2007 Gasoline Paper can be accessed at www.sae.org/technical/papers/2007-01-1235 [http://www.sae.org/technical/papers/2007-01-1235]

Both are available for purchase and immediate download from SAE.

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