

HEAVY-DUTY VEHICLE IN-USE EMISSION PERFORMANCE

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ABSTRACT

Engines for heavy-duty vehicles are emission certified by running engines according to specified load pattern or duty cycle. In the United States, the U.S. Heavy-Duty Transient cycle has been in use already for a number of years, and Europe is, according to the requirements of the Directive 1999/96/EC, gradually switching to transient-type testing.

Evaluating the in-use emission performance of heavy-duty vehicles presents a problem. Taking engines out of vehicles for engine dynamometer testing is difficult and costly. In addition, engine dynamometer testing does not take into account the properties of the vehicle itself (i.e., mass, transmission, etc.). It is also debatable how well the standardized duty cycles reflect real-life driving patterns.

VTT Processes has recently commissioned a new emissions laboratory for heavy-duty vehicles. The facility comprises both engine test stand and a fully transient heavy-duty chassis dynamometer. The roller diameter of the dynamometer is 2.5 m. Regulated emissions are measured using a full-flow CVS system. The heavy-duty vehicle chassis dynamometer measurements (emissions, fuel consumption) have been granted accreditation by the Centre of Metrology and Accreditation (MIKES, Finland).

A national program to generate emissions data on buses has been set up for the years 2002-2004. The target is to generate emission factors for some 50 different buses representing different degree of sophistication (Euro 1 to Euro5/EEV, with and without exhaust gas aftertreatment), different fuel technologies (diesel, natural gas) and different ages (the effect of aging). The work is funded by the Metropolitan Council of Helsinki, Helsinki City Transport, The Ministry of Transport and Communications Finland, and the national gas company Gasum Oy.

The International Association for Natural Gas Vehicles (IANGV) has opted to buy into the project. For IANGV, VTT will deliver comprehensive emissions data (including particle-size distribution and chemical and biological characterization of particles) for up-to-date diesel and natural gas vehicles.

The paper describes the methodology used for the measurements on buses, the test matrix, and some preliminary emissions data on both regulated and unregulated emissions.