

# Particle Emissions with Diesel Fuel (DF) and Biodiesel (RME)

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## Task

Particles from diesel exhaust are classified as carcinogenic. For a long time the particle mass emissions from diesel engines are regulated. Besides the mass the number and especially the size distribution is of importance.

A modern light duty truck engine was analysed with focus on particle number and mass distributions for different diesel fuels and biodiesel qualities. In Germany biodiesel consists mostly of rapeseed oil methylester.

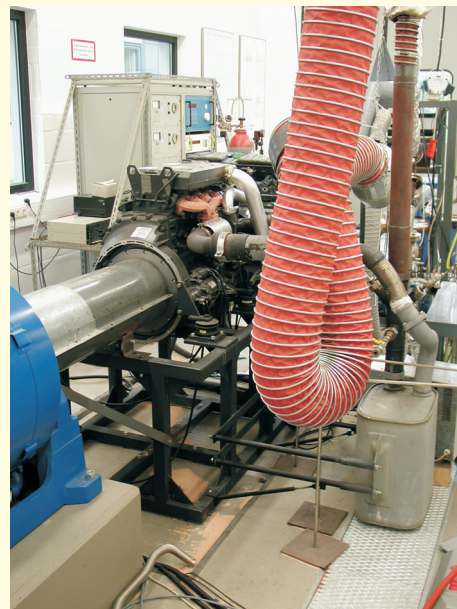


Fig. 1: Engine test stand at the Institute for Technology and Biosystems Engineering

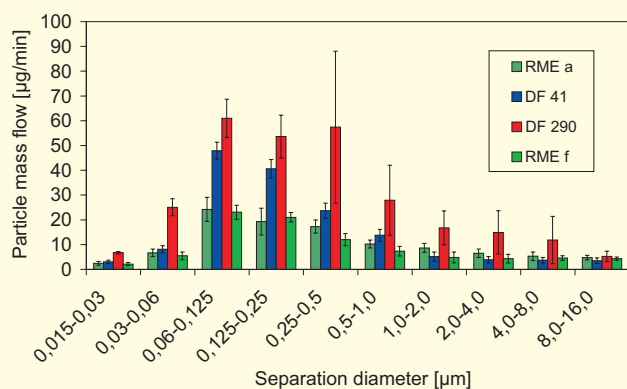


Fig. 2: Particle mass distribution as a function of particle size for different fuels (impactor, 13 mode test cycle, OM 904 LA)

## Results

Naturally aged (RME a) and fresh (RME f) biodiesel as well as diesel fuels with different sulphur contents (41 and 290 ppm) were used as test fuels. The test engine was a Mercedes Benz OM 904 LA light duty truck engine (125 kW). A BERNER low pressure impactor was used to determine the particle mass distribution and with a scanning mobility particle sizer (SMPS) the particle number distribution was investigated.

In general the particle distributions do not differ very much for the used fuels but the results with respect to particle mass are always lower for RME for all analysed size categories in comparison with DF (Fig. 2). Different RME qualities have only a secondary influence to the results. On the other hand the sulphur content leads to significant advantages for DF 41. Below 30 nm the particle number for RME (f) is highest (Fig. 3). In general RME emits above 30 nm less particles than DF. Particles smaller than 30 nm seem to be droplets without solid core. They can be reduced by using an oxidation catalyst. The particle analysis shows as well that the lower the sulphur content is the lower the particle emissions are.

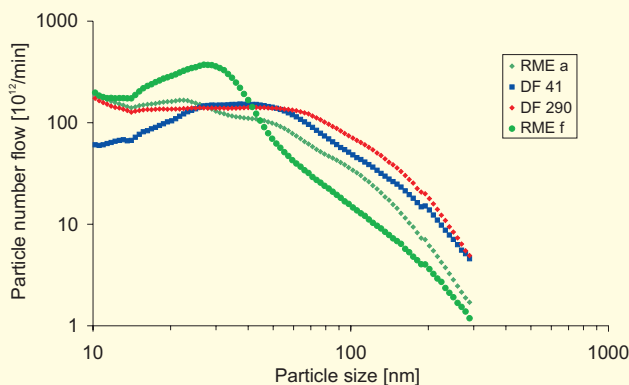


Fig. 3: Particle number distribution as a function of particle size for different fuels (SMPS, 13-mode test cycle, OM 904 LA)

## Acknowledgement

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