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EMISSIONS EFFECTS OF USING B20 IN THE CURRENT TRANSIT BUS FLEET

ReFUEL flywheel data and data from research community to verify the effects of biodiesel fuel on various engine technologies.

Vehicles tested included MAN, Cummins, Detroit, and Isuzu, with the majority of testing done in a controlled environment.

Approach

Chassis Dynamometer testing

SELECTED TEST CYCLES (IN DRIVING ENVIRONMENTS)

- MAN (9%–12%)
- DDC (10%–12%)
- Isuzu (10%–12%)
- Cummins (10%–12%)

Comparison of B20 to ULSD fuel in MAN and Isuzu vehicles

- MAN UDDS: 3%–5% increase in NOx emissions with B20/ULSD
- Isuzu Manhattan Cycle: statistically significant increase in NOx emissions with B20/ULSD

DPF-equipped: no PM sensitivity to fuel

- DPF-equipped MAN with B20/ULSD showed no PM sensitivity

Drive cycle influence on NOx emissions

- Malek, Academic Science
- Sanders, Academic Science
- Tartar, Academic Science

Feedback NOx control: insensitive to fuel

- Malek, Academic Science
- Sanders, Academic Science
- Tartar, Academic Science

NOx emissions more sensitive to duty cycle than to fuel

- Malek, Academic Science
- Sanders, Academic Science
- Tartar, Academic Science

B20 effect on NOx emissions statistically significant in fewer than half of vehicles

- Malek, Academic Science
- Sanders, Academic Science
- Tartar, Academic Science

Emissions: regulated emissions

- Malek, Academic Science
- Sanders, Academic Science
- Tartar, Academic Science

Flexible full-scale constant-volume-sampler system

- Malek, Academic Science
- Sanders, Academic Science
- Tartar, Academic Science

Controller Area Network (CAN)

- Malek, Academic Science
- Sanders, Academic Science
- Tartar, Academic Science

Thermocouples, etc.

- Malek, Academic Science
- Sanders, Academic Science
- Tartar, Academic Science

Carbon balance metering, gravimetric and volumetric

- Malek, Academic Science
- Sanders, Academic Science
- Tartar, Academic Science

Electrical / mechanical inertia

- Malek, Academic Science
- Sanders, Academic Science
- Tartar, Academic Science

Tandem 40" rolls (adjustable)

- Malek, Academic Science
- Sanders, Academic Science
- Tartar, Academic Science

Augmented braking

- Malek, Academic Science
- Sanders, Academic Science
- Tartar, Academic Science

Grade simulation

- Malek, Academic Science
- Sanders, Academic Science
- Tartar, Academic Science

Speed (mph)

- Malek, Academic Science
- Sanders, Academic Science
- Tartar, Academic Science

Time (s)

- Malek, Academic Science
- Sanders, Academic Science
- Tartar, Academic Science

Altitude simulation (sea level to 6000 ft)

- Malek, Academic Science
- Sanders, Academic Science
- Tartar, Academic Science

Automated warm-up and coast-down

- Malek, Academic Science
- Sanders, Academic Science
- Tartar, Academic Science

Grade simulation with electrical / mechanical inertia

- Malek, Academic Science
- Sanders, Academic Science
- Tartar, Academic Science

Recent research shows that using B20/ULSD has no effect on NOx emissions in buses without NOx emissions control. However, using B20/ULSD has a significant effect on NOx emissions in buses with NOx emissions control. In buses with NOx emissions control, however, using B20/ULSD has a significant effect on NOx emissions. This is consistent with previous research showing that biodiesel fuel can increase NOx emissions in certain conditions.

Results to date show that using B20/ULSD has little or no effect on NOx emissions in buses without NOx emissions control. However, using B20/ULSD has a significant effect on NOx emissions in buses with NOx emissions control. Results to date show that using B20/ULSD has little or no effect on NOx emissions in buses without NOx emissions control. However, using B20/ULSD has a significant effect on NOx emissions in buses with NOx emissions control.


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Using 20% blends of biodiesel fuel (B20) in regional transit buses, Kenny Osier, Dan Blankenship, Roaring Fork Transportation Authority, Lou Ha, the Clean Cities program goal of reducing petroleum consumption, advancing fuel economy, and reducing pollution from transportation.