DAIMLER

WHTC Investigations

Mercedes-Benz FUSO FREIGHTLINER WESTERN STAR Thomas BUILT BUSES

Influence of Soaktime on Emissions with a Euro VI Prototype MHDE
31 July 2009

Stein (TP/PHP)

Background

- **Framework**
  - WHDC gtr contains two options on the soaktime (5 min, 20 min)
  - WHDC chair proposed 10 min soaktime as compromise to solve the option
- **EPA rationale**
  - no backsliding in stringency of the US 2010 emission standards
  - acceptance of reduced manufacturer test program in order to be able to make a final decision by the November 2009 WP.29/AC.3 meeting
  - engine technology to be close to US 2010 or Euro VI
- **Daimler engine**
  - Euro VI prototype medium heavy duty engine with SCR/DPF
  - 6 cylinder inline, common rail high pressure injection
  - Euro VI ECU

Test Protocol

- Day 1 - cold/hot FTP (baseline)
- Day 2 - Cold WHTC, 10 min soak, hot WHTC, 20 min soak, hot WHTC, 10 min soak, hot WHTC (repeat sequence to fill allotted time)
- Day 3 - Cold WHTC, 20 min soak, hot WHTC, 20 min soak, hot WHTC, 10 min soak, hot WHTC (repeat sequence to fill allotted time)

Summary Data

	Emissions [g/kWh]					BSFC	Cycle Power
Day 1	HC	NOx	CO	CO2	PM	g/kWh	kWh
FTP cold	0,001	0,958	1,605	752	0,0009	247,93	17,39
FTP hot 20 min soak	0,001	0,118	0,679	719	0,0009	238,81	17,66
Day 2							
whtc cold	-0,002	1,290	0,761	708	0,0029	225,63	24,58
whtc hot 10 min soak	-0,005	0,313	0,202	682	0,0033	218,71	24,67
whtc hot 20 min soak	-0,004	0,310	0,253	679	0,0038	218,91	24,67
whtc hot 10 min soak	-0,005	0,268	0,139	676	0,0041	218,53	24,66
whtc hot 20 min soak	-0,004	0,286	0,130	681	0,0040	219,69	24,65
whtc hot 10 min soak	-0,005	0,254	0,094	679	0,0036	218,68	24,65
whtc hot 20 min soak	-0,004	0,292	0,141	681		218,29	24,67
whtc hot 10 min soak	-0,004	0,246	0,084	681		218,63	24,66
whtc hot 20 min soak	-0,004	0,284	0,158	681	0,0035	219,54	24,65
whtc hot 10 min soak	-0,004	0,250	0,103	678	0,0037	219,30	24,65
whtc hot 20 min soak	-0,004	0,282	0,133	679	0,0037	219,22	24,66
whtc hot 10 min soak	-0,004	0,238	0,104	680	0,0037	218,37	24,67
whtc hot 20 min soak	-0,004	0,285	0,131	681	0,0033	219,35	24,64
whtc hot 10 min soak	-0,004	0,255	0,102	681	0,0035	218,62	24,66
Day 3							
whtc cold	0,014	1,599	0,808	680	0,0046	225,59	24,57
whtc hot 20 min soak	-0,004	0,411	0,400	670	0,0055	219,29	24,64
whtc hot 20 min soak	-0,003	0,359	0,358	670	0,0071	219,14	24,66
whtc hot 10 min soak	-0,005	0,263	0,120	666	0,0057	218,28	24,65
whtc hot 20 min soak	-0,003	0,327	0,161	672	0,0054	219,69	24,63
whtc hot 10 min soak	-0,005	0,286	0,085	666	0,0050	218,23	24,66
whtc hot 20 min soak	-0,004	0,308	0,162	668	0,0054	218,68	24,67
whtc hot 10 min soak	-0,005	0,237	0,129	668	0,0057	218,21	24,66
whtc hot 20 min soak	-0,003	0,317	0,185	669		218,64	24,66
whtc hot 10 min soak	-0,005	0,278	0,105	667		218,54	24,65
whtc hot 20 min soak	-0,003	0,286	0,155	671	0,0021	219,11	24,63
whtc hot 10 min soak	-0,004	0,238	0,104	680	0,0052	218,63	24,66
whtc hot 20 min soak	-0,003	0,334	0,166	671	0,0051	219,32	24,63
whtc hot 10 min soak	-0,004	0,245	0,089	668	0,0056	218,63	24,66

Composite Cycle Results (14% Cold Start Weighting)

Test	Emissions [g/kWh]					BSFC
	HC	NOx	CO	CO2	PM	g/kWh
FTP cold	0,001	0,958	1,605	752	0,0009	247,93
FTP hot 20 min soak	0,001	0,118	0,679	719	0,0009	238,81
FTP cold/hot weighted	0,001	0,236	0,809	724	0,0009	240,10
whtc cold	-0,002	1,290	0,761	708	0,0029	225,63
whtc hot 10 min soak	-0,005	0,313	0,202	682	0,0033	218,71
whtc cold/hot weighted	0,000	0,453	0,282	686	0,0032	219,70

NOx Test Results