SEMA Emission Lab Test Report

for Exhaust Emission Test Procedures according

Date:	6/18/2020	**Time:**	9:33:17
Test Legislation:	EPA		
Test Cycle:	HWFET+HWFET		
Test Purpose:	Certification		
Test Name:	HWFET_HWFET		
Test Cell:	iGEMV_TC1		
Remark:	HWFET, With Derive Tune Installed		

CONFIDENTIAL

Date: 6/26/20

Accept ✓ Reject

Signature:

TestInformation

General Data

Test Number	*HWFET_HWFET_20200618_02_TC1*		
Test Name	*HWFET_HWFET*		
Test Cell	*iGEMV_TC1*		
Test Type	*HWFET_HWFET*		
Legislation	*EPA*		
Requirements (Bag)	*CERTIFICATION*		
Date	*6/18/2020*	CH_4 Response Factor	
Test Start	*9:33:17*	Odometer Start[mile]	*83380*
Start Time Cycle	*2020-06-18 09|56-42-(000)*	Delay Time Method	*Default*
Test End	*10:29:34*		
Operator	*Dan Ogden*	Air Condition	*YES*
Driver	*Mario Michel*	Particle Measurement	OFF
Shifttable	Auto		
Flow Stream	*Bag Only Diesel*		
Calibrated Ranges	*autorange*		
Remark :	*HWFET, With Derive Tune Installed*		

Vehicle Data

Test Group	*Derive F-250*	Transmission	*Automatic*
Manufacturer	*Ford*	Drive Axle Weight[lb]	*0*
Model	*F-250*	Tank Position	
Model Year	*2011*	Tank Material	*Plastic*
VIN	*1FT7W2BT9BEA15523*	Tank Volume[gal]	*26.00*
License Plate	*HJHU73*	Evaporative Family	*N/A*
Order Number		Canister Volume[l]	*0.00*
Engine Family	*BFMXD06.761A*	Canister Working Capacity[g]	*0*
Engine Trim Level	*trimEng*	Tire Manufacturer	*CONTINENTAL*
Engine Code	*codeEng*	Tire Model	*CONTITRAC TR*
Displacement [l]	*6.700*	Tire Size	*275/70/18*
Number of Cylinders	*6*	Tire Pressure [psi]	*65*

Dyno Data

Dyno Type	*SREV*	A [lbf]	*61.4690*
Inertia [lb]	*9500.00*	B [lbf/mph]	*0.14073*
Simulation Coefficient N	*2*	C [lbf/mph2]	*0.049012*

Fuel Data *2007 Certification Diesel HD0521GP10*

Fuel Type	*DIESEL*	Fuel Temperature [°C]	*15.56*
Fuel Analyze Date		Fuel Density [kg/l]	*0.8542*
Fuel Manufacturer		Net Heat. Val. [BTU/lb]	*18325*
Fuel Tank Number		Carb. Weight Frac.	*0.8670*
Fuel Charge		HC Ratio	*1.8282*
Remarks:	*2007 Certification Diesel HD0521GP10*	OC Ratio	*0.0000*

Weather Limit Data

Test Data	HWFET_HWFET	Operator	Dan Ogden	Speed Table		Date:	
Test Number	HWFET_HWFET_20200618_02_1	Driver	Mario Michel	Shift Table	Auto	Cold Start	

Vehicle		**Dyno**		**Fuel**		**Test Timing**	
VIN	*1FT7W2BT9BEA15523*	Inertia [lb]	*9500.00*	2007 Certification Diesel HD0521GP10		Start Time	*9:33:17*
		A [lbf]	*61.469*	Fuel type	DIESEL	End Time	*10:29:34*
Model	F-250	B [lbf/mph]	*0.14073*	Density	*0.8542*		
Model Year	*2011*	C [lbf/mph2]	*0.049012*	NHV	18325	Soak Time	
Engine Family	BFMXD06.761A			CWF	*0.8670*		
Displacement [l]	*6.700*						
Transmission	*Automatic*						
Odometer Start [mile]	*83380*	Flow Stream	Bag Only Diesel				
Odometer End [mile]	*83400*	Remark	HWFET, With Derive Tune Installed				

Bag Analysis

PHASE 1	THC [ppmC]	CO [ppm]	CO_2 [%]	NO_x [ppm]	CH_4 [ppm]	NMHC [ppm]				
Range	*200*	*250*	*2.000*	*30*	*60*		Temp. [°F]	78.42	Volume [scf]	12649
Zero Value	*0.00*	*0.0*	*0.0*	*0.0*	*0.0*		Press. [in-Hg]	29.13	D.F.	*18.13*
Span Value	*189.92*	*243.15*	*1.898*	*25.235*	*57.400*		RH [%]	*42.43*	Ph. Start [s]	0.0
Sample	*0.14*	*-0.28*	*0.683*	*0.177*	*0.202*	*-0.090*	AH [gr/kg]	*8.996*	Ph. End [s]	765.0
Mass.	*0.029*	*0.000*	*4481.299*	*0.115*	*0.048*	*0.000*	Dist. [mi]	*10.24*	Ph. Length [s]	765.1
Mass per Dist.	*0.0028*	*0.0000*	*437.726*	*0.0112*	*0.0047*	*0.0000*	NO_x Corr. F	*0.95*	Bag An. Del	*498*
							Dr. Viola.	*0*	Vio. Durat. [s]	0.0
							Crank [s]	*0.0*	FE [mile/gal]	23.2

SPC Mass Particles [g] SPC Mass per Dist. [g/mile]

Total Result

actual	THC [g/mile]	CO [g/mile]	CO2 [g/mile]	NOX [g/mile]	CH4 [g/mile]	NMOG [g/mile]	NMHC [g/mile]	NMHC+NO_x [g/mile]	*Fuel Economy*	
Mass per Dist.	0.0028	*0.0000*	*437.73*	*0.0112*	*0.0047*	*0.0000*	*0.0000*	0.011	mile/gal	*23.25*
Mass per Dist. (rounded)	0.0028	*0.0000*	*437.7*	*0.0112*	*0.0047*	*0.000*	*0.0000*	0.011	Dist. [mi]	*10.24*
Mass per Dist. - Part SPC [mg/mile]										

CONFIDENTIAL

Date: 6/26/20

Accept_____ Reject_____

Signature:

CVS Data		Cycle data		Environmental Data	
Dilution Factor (Bag)	18.13	Vio. Dur.[s]	0.0	Rel. Hum.[%]	42.43
Dilution Factor (Modal)		Number	0	Ab. Hum.[g/lbs]	9.00
CVS Volume[scf]	12649.08	Act. Dist.[mi]	10.24	Pressure[inHg]	29.13
CVS Flow[scfm]	992.06			Temp.[°F]	78.42
CVS Inlet Pressure	28.41			Temp. Min.[°F]	76.64
CVS Inlet Temp.[°F]	112.15			Temp. Max.[°F]	80.60
CVS Inlet Temp. Min.[°F]	108.37			NO_X Corr. F	0.95
CVS Inlet Temp. Max.[°F]	115.98				

Particulate

SPC Particulate Results			Avg	Max	Min
Primary Filter Particle Mass [ug]		Temp Air Particlulate Dil [deg F]			
Mass Particles [g]		Temp Gas Particulate [deg F]			
Massflow Particles [g/h]		Pressure Gas Particulate			
Mass per Dist. [g/mile]		Dilution Ratio			
Particulate Sampling Time [s]		Pressure Drop Pri Filter [mbar]			
Primary Filter ID	A1				
Filter Diameter [mm]	47				

Bag

Concentrations	THC[ppmC]	CO[ppm]	CO_2[%]	NO_X[ppm]	CH_4[ppm]	NMHC[ppm]
Range	200	250	2.000	30	60	
Sniff	0.000	1.077	0.741	0.341	2.657	
Zero Value	0.005	-0.023	0.000	0.000	0.000	
Zero Offset[%]	0.069	0.002	-0.002	0.000	-0.014	
Span Value	189.920	243.150	1.898	25.235	57.400	
Span Offset[%]	-0.216	-0.020	-0.036	-0.107	-0.676	
Sample	3.533	0.006	0.739	0.328	2.165	1.087
Std. Dev.	0.000	0.005	0.004	0.017	0.000	
Ambient	3.593	0.306	0.059	0.160	2.077	
Std. Dev.	0.004	0.004	0.001	0.010	0.000	
Corrected	0.139	-0.283	0.683	0.177	0.202	-0.090
Mass	THC[g]	CO[g]	CO_2[g]	NO_X[g]	CH_4[g]	NMHC[g]
Uncorrected	0.0289	0.0000	4481.299	0.1149	0.0484	0.0000
Corrected	0.0289	0.0000	4481.299	0.1149	0.0484	0.0000
Mass per distance	THC[g/mile]	CO[g/mile]	CO_2[g/mile]	NO_X[g/mile]	CH_4[g/mile]	NMHC[g/mile]
Corrected for Lost Sample Mass	0.0028	0.0000	437.726	0.0112	0.0047	0.0000

Fuel Consumption

Fuel Consumption[g]	1423.948	Fuel Consumption[l/100km]	10.118
Fuel Consumption[l]	1.667	**Fuel Economy**[mile/gal]	23.245

Test Data: HWFET_HWFET Operator: Dan Ogden Date: 6/18/2020
Test Number: HWFET_HWFET_20200618_02_TC1 Driver: Mario Michel

Driver Violations

		P	Phase 1
Number of Violations	-	0	0
Duration of Violations	(s)	0.0	0.0

Number	Phase	Violation Begin (s)	Violation End (s)	Violation Duration (s)	Scheduled Speed (mph)	Max Speed Deviation (mph)
No Violations In This Test				0.0		

Test Record #: HWFET_HWFET_20200618_02_TC1

Phase 1

Analyzer Adjust

	Range Number	Range	Zero Value	Zero Set Value	Zero Offset	Span Value	Span Set Value	Span Offset	ReZero Value
		ppm	ppm	ppm	%	ppm	ppm	%	ppm
CO_2	1	20000	-0.49	0.00	0.00	18983.20	19010.00	-0.13	-0.37
CO	1	250	-0.02	0.00	-0.01	243.15	243.00	0.06	-0.10
NO_X	1	30	0.00	0.00	0.00	25.24	25.20	0.12	0.01
THC (ppmC	2	200	0.00	0.00	0.00	189.92	189.90	0.01	0.29
CH_4	1	60	0.00	0.00	0.00	57.40	57.40	0.00	0.13
N2O				0.00					

Analyzer Check

	Range Number	Range	Zero Value	Zero Set Value	Zero Drift	Span Value	Span Set Value	Span Drift	2% Drift Validation
		ppm	ppm	ppm	%	ppm	ppm	%	
CO_2	1	20000	-0.45	0.00	0.00	19002.86	19010.00	0.10	
CO	1	250	0.00	0.00	0.04	242.95	243.00	-0.08	
NO_X	1	30	0.00	0.00	-0.02	25.17	25.20	-0.22	
THC (ppmC	2	200	0.14	0.00	-0.08	189.47	189.90	-0.23	
CH_4	1	60	-0.01	0.00	-0.23	56.99	57.40	-0.68	
N2O				0.00					

Emission Lab Test Report

Drive Cycle Energy Summary

Test Record #: HWFET_HWFET_20200618_02_TC1

Test Cycle HWFET+HWFET

Test Legislation EPA

Vehicle ID 1FT7W2BT9BEA15523

DYNO Data

	Road Load	Street Load
Inertia [lb]	*9500.00*	
A [lbf]	*61.469*	*80.650*
B [lbf/mph]	*0.14073*	*1.58910*
C [lbf/mph2]	*0.049012*	*0.038900*

	Phase1	Phase2	Phase3	Weighted
Distance				
Target	16506.54			
Driven	16476.84			
Distance Rating (%)	-0.1800			
Cycle Energy (MJ)				
Target	20.94			
Driven	20.58			
Distance per Energy Cycle (m/MJ)				
Target	788.29			788.29
Driven	800.69			800.69
Road Load Work Fraction				
Target	0.7579			
Driven	0.7961			
Inertial Work (MJ)				
Target	5.07			5.07
Driven	4.20			4.20
Inertial Work Fraction				
Target	0.2421			
Driven	0.2039			
Inertial Work Rating	-17.2096			-17.2096
Absolute Speed Change (m/s2)				
Target	130.69			130.69
Driven	111.23			111.23
Absolute Speed Change Rating (%)	-14.8938			-14.8938
Energy Rating	-1.5735			
Energy Economy Rating	-1.5735			-1.5735