



Team Results for Clean Snowmobile Challenge 2019 Team 104



2019 Clean Snowmobile Competition - Lab Emission Event Emission Data Sheet

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Test Date       : 2019/03/05 11:06:50
Team Name      : Buffalo
Team Number    : 104
Model          : Smart Car Diesel
Engine         : Mercedes
Displacement[cc] : 799.00
100% Speed     : 3878
100% Torque    : 74.1
No of Strokes  : 4
Fuel           : Diesel
                H/C: 1.81      O/C: 0.00
  
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ModeNum	:	1	2	3	4	5	RMC
Weighting	:	0.12	0.27	0.25	0.31	0.05	1.00
Power	kW :	30.7	13.0	7.5	3.7	0.0	9.9
HC_m	g/hr :	2.44	0.00	0.00	0.55	0.08	0.11
CO_m	g/hr :	0.08	0.02	0.00	0.03	0.01	0.04
NOx_m	g/hr :	342.64	106.55	71.73	37.86	17.77	99.05
Soot_m	mg/hr:	1.88	1.50	1.26	0.90	0.60	-0.92
N2O_m	mg/hr:	0.15	0.03	0.02	0.04	0.02	0.05
CO2_m	g/hr :	25670.31	11208.85	7205.75	4752.46	1431.82	9870.24
CH4_m	g/hr :	0.29	0.08	0.08	0.18	0.10	0.13
W_HC	g/hr :	0.29	0.00	0.00	0.17	0.00	0.11
W_CO	g/hr :	0.01	0.01	0.00	0.01	0.00	0.04
W_NOx	g/hr :	41.12	28.77	17.93	11.74	0.89	99.05
W_HCNOx	g/hr :	41.41	28.77	17.93	11.91	0.89	99.16
W_Soot	mg/hr:	0.23	0.41	0.32	0.28	0.03	-0.92
W_N2O	g/hr :	0.02	0.01	0.01	0.01	0.00	0.05
W_CO2	g/hr :	3080.44	3026.39	1801.44	1473.26	71.59	9870.24
W_CH4	g/hr :	0.03	0.02	0.02	0.05	0.00	0.13

Total Weighted Power [kW] 10.222

Weighted Emissions

	HC	CO	NOx	HC+NOx
Total Mass [g/hr]	0.47	0.02	100.44	100.91
Specific Mass [g/kW-hr]	0.05	0.00	9.83	9.87
BSFC [g/kW-hr]	305.0			

Total Soot [mg/hr] 1.26 Specific Soot [mg/kW-hr] 0.12

Not Used for Competition

Total N2O [mg/hr]	0.04	Specific N2O [mg/kW-hr]	0.00
Total CO2 [g/hr]	9453.12	Specific CO2 [g/kW-hr]	924.81
Total CH4 [g/hr]	0.14	Specific CH4 [g/kW-hr]	0.01
RMC BSFC [g/kW-hr]	314.90		

EMISSION TESTS:

	Value	Limit	Result
Power	30.08	<96.94 kW	PASS
Soot	0.12	<50 mg/kW-hr	PASS
CO	0.00	<275 g/kW-hr	PASS
HC + NOX	9.87	<90 g/kW-hr	PASS
E-Score	203.42	>175	PASS
Valid Data for All 5 Modes			PASS
RMC			PASS
LAB EMISSION TEST			PASS



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Modal Raw Data : Engine / Environmental

ModeNum		1	2	3	4	5	RMC
Total Points	points	600	1520	1200	1200	1200	11432
PtsInMode	points	1210	3370	3470	1800	1480	11432
Speed	rpm	3877.49	3296.47	2908.73	2518.91	900.28	2951.72
Torque	Nm	75.59	37.76	24.52	14.09	0.00	31.88
Power	kW	30.70	13.04	7.47	3.72	0.00	9.85
BSFC	g/kw-hr	262.95	270.29	303.29	402.22	**	314.90
Fuel	g/hr	8071.31	3523.24	2264.95	1494.39	450.14	3102.60
T_int	degC	46.50	32.11	31.05	30.99	24.14	32.33
RelHumid	%	18.96	17.88	14.57	20.21	14.96	17.37
Baro	in Hg	28.71	28.72	28.72	28.71	28.72	28.72
Baro	mmHg	729.29	729.50	729.53	729.35	729.57	729.44
Pvap_kPa	kPa	1.43	0.67	0.52	0.72	0.37	0.66
Pvap_inHg	inHg	0.42	0.20	0.15	0.21	0.11	0.20
AbsHumidity	grains/lb	64.99	30.31	23.36	32.39	16.71	29.77
SatPres	kPa	95.80	96.59	96.74	96.52	96.89	96.59
Hum Factor		0.96	0.83	0.80	0.83	0.78	0.82
F_fac		1.09	1.04	1.04	1.04	1.02	1.04
K_fac		1.07	1.05	1.05	1.05	1.03	1.05
Humidity	g/kg	9.28	4.33	3.34	4.63	2.39	4.25
H2		0.00	0.00	0.00	0.00	0.00	0.00
WetDry Factor		0.92	0.95	0.95	0.96	0.98	1.00



**Team Results for
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Modal Emissions Concentrations

ModeNum		1	2	3	4	5	RMC
THC	ppmC1	24.62	0.01	0.00	13.54	3.15	1.79
CO	%	0.00	0.00	0.00	0.00	0.00	0.00
N2O	ppm	4.84	1.37	1.38	3.02	2.64	2.30
CH4	ppm	2.54	1.14	1.37	3.73	3.40	1.88
CO2	%	8.14	5.46	4.60	3.66	1.78	5.00
O2	%	8.32	12.26	13.54	14.84	17.29	13.55
CNOx	ppm	1039.64	496.74	438.13	278.64	211.60	480.14
AHC	ppm	0.00	0.00	0.00	0.00	0.00	0.00
C2H2	ppm	0.13	0.02	0.01	0.07	0.01	0.03
C2H4	ppm	0.29	0.18	0.14	0.15	0.11	0.18
C3H6	ppm	0.31	0.36	0.27	0.20	0.35	0.30
C4H6	ppm	0.49	0.41	0.34	0.31	0.29	0.36
ETOH	ppm	2.32	1.87	1.59	1.77	1.41	1.88
H2O	%	7.72	5.29	4.51	3.71	2.24	0.00
HCHO	ppm	2.03	0.01	0.01	0.80	0.00	0.39
HCN	ppm	0.59	0.24	0.24	0.18	0.16	0.25
HNCO	ppm	2.46	1.67	1.37	1.83	1.12	1.82
MECHO	ppm	0.01	0.00	0.00	0.00	0.00	0.00
NC5	ppm	1.65	1.35	1.37	1.36	1.17	1.39
NH3	ppm	0.04	0.03	0.03	0.04	0.03	0.04
NO	ppm	963.84	327.34	277.23	232.32	67.29	371.15
NO2	ppm	125.10	273.66	267.22	102.15	202.32	211.07
Soot	mg/m3	0.01	0.01	0.01	0.01	0.01	-0.01
AFR	:1	24.77	36.99	43.97	55.05	111.43	41.64



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Measurement Accuracy (SAE paper 961804)

ModeNum	H2_XLS %	ModalHC_Dry %	ModalFTIR_H2O %	N2 %	Ar %	AFR :1	Tr_Eff -
1	0.000	0.003	7.715	80.937	0.936	24.730	0.588
2	0.000	0.000	5.290	79.564	0.920	36.912	0.400
3	0.000	0.000	4.511	79.167	0.915	43.882	0.341
4	0.000	0.001	3.707	78.417	0.906	54.971	0.280
5	0.000	0.000	2.237	76.777	0.887	111.231	0.169

ModeNum	ModalWHC %	ModalC1 %	ModalC8 %	ModalSUM_HC %	ModalT_Emiss %	ModalError %
1	2.440	-3.636	-0.455	-4.091	95.740	4.260
2	0.001	-3.458	-0.432	-3.890	95.368	4.632
3	0.000	**	**	**	**	**
4	0.553	-2.732	-0.341	-3.073	95.493	4.507
5	0.079	-1.515	-0.189	-1.704	95.495	4.505

Carbon Balance Verification

		1	2	3	4	5	6
Power	kW	30.695	13.035	7.468	3.715	0.000	9.853
BSFC	g/kw-hr	262.95	270.29	303.29	402.22	**	314.90
Fuel_MassFlow	g/hr	8071.3	3523.2	2264.9	1494.4	450.1	3102.6
HC_m	g/hr	2.4402	0.0006	0.0000	0.5531	0.0794	0.1107
CO_m	g/hr	0.079021	0.020454	0.000000	0.030657	0.008984	0.043886
CO2_m	g/hr	25670	11209	7206	4752	1432	9870
TW_Power	kW	10.222					
TW_BSFC	g/kw-hr	305.04					
Fuel_MassFlow	g/hr	8071.3	3523.2	2264.9	1494.4	450.1	3102.6
FuelCalc	g/hr	8071.5	3523.2	2264.9	1494.4	450.1	3102.6
FuelCalcDev	%	-0.0027711	0.0018143	0.0018168	-0.0037993	-0.0008611	0.0012751

\$HCR_ENG	1.808
\$OCR_ENG	0
MassFracCFuel H/C ratio	0.86826

Power Run

Team 104

TeamNumber	104
TeamName	Buffalo
Model	Smart Car Diesel
Engine	Mercedes

Displacement cc	799.00
RatedSpeed	3878
RatedTorque	74.1

