



Team Results for Clean Snowmobile Challenge 2011

2011 Clean Snowmobile Competition - Lab Emission Event Emission Data Sheet

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Test Date      :
Team Name     : Ecole De Technologie Superieure
Team Number   : 14
Model        : ETS
Engine       : ETS
Displacement[cc] : 600cc
100% Speed   : 7000
100% Torque  : 73.0
No of Strokes : 2
Fuel         : Gasoline           H/C: 1.92       O/C: 0.10
  
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ModeNum	:	1	2	3	4	5
Weighting	:	0.12	0.27	0.25	0.31	0.05
Power kW	:	44.7	22.9	13.8	7.1	0.0
HC_m g/hr	:	10328.48	1082.89	2250.57	1381.58	944.84
CO_m g/hr	:	40581.08	12526.49	7299.87	7045.42	1715.02
NOx_m g/hr	:	255.65	35.98	26.25	3.71	5.95
Soot_m mg/hr	:	733.40	0.00	115.64	80.70	57.83
N2O_m mg/hr	:	0.26	0.02	0.02	0.01	0.00
CO2_m g/hr	:	42175.50	29026.03	19933.35	11992.21	8388.15
CH4_m g/hr	:	252.74	76.19	28.74	69.84	25.29
W_HC g/hr	:	1239.42	292.38	562.64	428.29	47.24
W_CO g/hr	:	4869.73	3382.15	1824.97	2184.08	85.75
W_NOx g/hr	:	30.68	9.71	6.56	1.15	0.30
W_HCNOx g/hr	:	1270.10	302.09	569.21	429.44	47.54
W_Soot mg/hr	:	88.01	0.00	28.91	25.02	2.89
W_N2O g/hr	:	0.03	0.00	0.01	0.00	0.00
W_CO2 g/hr	:	5061.06	7837.03	4983.34	3717.58	419.41
W_CH4 g/hr	:	30.33	20.57	7.19	21.65	1.26

Total Weighted Power [kW] 17.185

Weighted Emissions

	HC	CO	NOx	HC+NOx
Total Mass [g/hr]	2569.97	12346.68	48.40	2618.37
Specific Mass [g/kW-hr]	149.55	718.45	2.82	152.36
BSFC [g/kW-hr]	913.4			

Total Soot [mg/hr] 144.83 Specific Soot [mg/kW-hr] 8.43

Not Used for Competition

Total N2O [mg/hr]	0.04	Specific N2O [mg/kW-hr]	0.00
Total CO2 [g/hr]	22018.42	Specific CO2 [g/kW-hr]	1281.24
Total CH4 [g/hr]	81.00	Specific CH4 [g/kW-hr]	4.71

EMISSION TESTS:

	Value	Limit	Result
Power	53.51	<96.94 kW	PASS
Soot	8.43	<100 mg/kW-hr	PASS
CO	718.45	<275 g/kW-hr	FAIL
HC + NOX	152.36	<90 g/kW-hr	FAIL
E-Score	-71.19	>100	FAIL
Valid Data for All 5 Modes			PASS

LAB EMISSION TEST FAIL



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Modal Raw Data : Engine / Environmental

ModeNum		1	2	3	4	5
Total Points	points	339	1164	1206	1206	1206
PtsInMode	points	461	1201	1206	1206	1206
Speed	rpm	7001.01	5952.56	5253.90	4557.69	2674.30
Torque	Nm	60.99	36.70	25.00	14.90	0.00
Power	kW	44.71	22.87	13.75	7.11	0.00
BSFC	g/kw-hr	981.89	722.22	887.25	1221.85	**
Fuel	g/hr	43903.94	16520.22	12203.35	8690.81	4457.39
T_int	degC	13.79	12.37	12.16	13.35	14.18
RelHumid	%	34.21	31.16	30.89	28.70	28.51
Baro	in Hg	28.72	28.71	28.71	28.70	28.69
Baro	mmHg	729.51	729.20	729.15	728.91	728.78
Pvap kPa	kPa	0.48	0.40	0.39	0.39	0.41
Pvap inHg	inHg	0.14	0.12	0.12	0.12	0.12
AbsHumidity	grains/lb	21.58	18.10	17.72	17.65	18.39
SatPres	kPa	96.78	96.82	96.82	96.79	96.75
Hum Factor		1.00	1.00	1.00	1.00	1.00
F_fac		1.00	0.99	0.99	1.00	1.00
K_fac		1.02	1.01	1.01	1.02	1.02
Humidity	g/kg	3.08	2.59	2.53	2.52	2.63
H2		4.42	2.18	1.86	2.81	0.79
WetDry Factor		0.89	0.89	0.89	0.90	0.92



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Modal Emissions Concentrations

ModeNum		1	2	3	4	5
THC	ppmC1	42234.02	8621.41	27212.81	23485.58	22975.32
CO	%	8.26	4.97	4.40	5.96	2.08
N2O	ppm	3.37	0.40	0.90	0.42	0.00
CH4	ppm	900.94	528.77	302.99	1034.92	536.10
CO2	%	5.47	7.32	7.64	6.46	6.46
O2	%	4.20	3.94	4.31	4.55	8.36
CNOx	ppm	316.95	86.84	96.25	19.13	43.87
AHC	ppm	1942.55	422.59	1574.37	1304.45	1329.15
C2H2	ppm	415.35	210.20	186.76	686.97	412.95
C2H4	ppm	439.50	527.14	174.34	389.04	382.67
C3H6	ppm	223.27	162.21	72.64	77.94	107.73
C4H6	ppm	16.94	7.64	5.01	9.39	12.92
ETOH	ppm	3442.55	326.91	2385.40	1803.91	1793.25
H2O	%	10.54	11.07	10.52	10.24	7.96
HCHO	ppm	326.21	560.22	161.92	143.32	200.48
HCN	ppm	11.82	10.37	5.07	13.46	5.69
HNCO	ppm	4.12	55.19	0.00	0.00	0.00
MECHO	ppm	571.38	301.62	301.10	175.16	244.80
NC5	ppm	21.06	139.72	1224.74	1309.69	1156.05
NH3	ppm	6.90	6.84	6.59	9.43	0.94
NO	ppm	25.10	56.11	31.45	3.74	2.24
NO2	ppm	295.98	30.67	64.71	15.39	41.63
Soot	mg/m3	1.80	0.00	0.82	0.82	0.82
AFR	:1	5.85	10.85	8.06	8.21	10.96



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Clean Snowmobile Challenge 2011**

Measurement Accuracy (SAE paper 961804)

H2_XLS %	ModalHC_Dry %	ModalFTIR_H2O %	N2 %	Ar %	AFR :1	Tr_Eff -
4.942	4.721	10.538	77.043	0.891	10.147	0.780
2.448	0.969	11.068	78.100	0.903	14.058	0.799
2.080	3.041	10.522	78.403	0.906	12.812	0.779
3.130	2.616	10.239	77.058	0.891	12.533	0.766
0.863	2.496	7.957	78.938	0.912	17.909	0.579

ModalWHC %	ModalC1 %	ModalC8 %	ModalSUM_HC %	ModalT_Emiss %	ModalError %
10328.478	0.311	0.039	0.350	103.303	3.303
1082.890	-2.001	-0.250	-2.251	97.457	2.543
2250.571	-0.607	-0.076	-0.683	98.983	1.017
1381.579	-1.238	-0.155	-1.393	98.605	1.395
944.841	-2.456	-0.307	-2.763	96.322	3.678

Power Run

TeamNumber	14
TeamName	Ecole De Technologie Superieure
Model	ETS
Engine	ETS

Displacement cc	600cc
RatedSpeed	7000
RatedTorque	73.0

