



Team Results for Clean Snowmobile Challenge 2013 Team 1



2012 Clean Snowmobile Competition - Lab Emission Event Emission Data Sheet

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Test Date       : 2013/03/07 14:53:14
Team Name      : Clarkson
Team Number    : 1
Model         : Rotax
Engine        : 600 ACE
Displacement[cc] : 600.00
100% Speed    : 7309
100% Torque   : 50.7
No of Strokes : 4
Fuel          : GASOLINE           H/C: 2.50       O/C: 0.28
  
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ModeNum	:	1	2	3	4	5
Weighting	:	0.12	0.27	0.25	0.31	0.05
Power kW	:	41.0	17.0	9.7	5.2	0.0
HC_m g/hr	:	167.64	38.47	25.05	24.52	45.66
CO_m g/hr	:	2654.24	478.59	313.19	49.88	72.02
NOx_m g/hr	:	398.27	294.55	148.40	176.40	0.70
Soot_m mg/hr	:	226.22	44.52	1.94	0.79	0.18
N2O_m mg/hr	:	0.02	0.05	0.02	0.02	0.00
CO2_m g/hr	:	41072.92	19013.67	13013.96	8623.46	1981.86
CH4_m g/hr	:	27.14	4.12	1.28	0.72	0.85
W_HC g/hr	:	20.12	10.39	6.26	7.60	2.28
W_CO g/hr	:	318.51	129.22	78.30	15.46	3.60
W_NOx g/hr	:	47.79	79.53	37.10	54.68	0.03
W_HCNOx g/hr	:	67.91	89.91	43.36	62.29	2.32
W_Soot mg/hr	:	27.15	12.02	0.48	0.24	0.01
W_N2O g/hr	:	0.00	0.01	0.01	0.01	0.00
W_CO2 g/hr	:	4928.75	5133.69	3253.49	2673.27	99.09
W_CH4 g/hr	:	3.26	1.11	0.32	0.22	0.04

Total Weighted Power [kW] 13.552

Weighted Emissions

	HC	CO	NOx	HC+NOx
Total Mass [g/hr]	46.65	545.09	219.14	265.79
Specific Mass [g/kW-hr]	3.44	40.22	16.17	19.61
BSFC [g/kW-hr]	436.0			

Total Soot [mg/hr] 39.90 Specific Soot [mg/kW-hr] 2.94

Not Used for Competition

Total N2O [mg/hr]	0.03	Specific N2O [mg/kW-hr]	0.00
Total CO2 [g/hr]	16088.30	Specific CO2 [g/kW-hr]	1187.15
Total CH4 [g/hr]	4.96	Specific CH4 [g/kW-hr]	0.37

EMISSION TESTS:

	Value	Limit	Result
Power	38.81	<96.94 kW	PASS
Soot	2.94	<100 mg/kW-hr	PASS
CO	40.22	<275 g/kW-hr	PASS
HC + NOX	19.61	<90 g/kW-hr	PASS
E-Score	186.87	>100	PASS
Valid Data for All 5 Modes			PASS

LAB EMISSION TEST PASS



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Modal Raw Data : Engine / Environmental

ModeNum		1	2	3	4	5
Total Points	points	600	1200	1200	1200	1200
PtsInMode	points	1200	1800	1800	1800	1800
Speed	rpm	7305.46	6098.77	5450.65	4752.74	1452.97
Torque	Nm	53.59	26.55	17.07	10.49	0.00
Power	kW	41.00	16.96	9.74	5.22	0.00
BSFC	g/kw-hr	368.58	387.30	460.54	554.98	**
Fuel	g/hr	15111.03	6566.85	4485.95	2898.65	737.63
T_int	degC	14.99	16.18	17.26	17.73	18.05
RelHumid	%	31.83	23.17	20.95	18.98	18.45
Baro	in Hg	29.27	29.26	29.26	29.26	29.26
Baro	mmHg	743.34	743.27	743.17	743.13	743.10
Pvap_kPa	kPa	0.48	0.37	0.36	0.33	0.33
Pvap_inHg	inHg	0.14	0.11	0.11	0.10	0.10
AbsHumidity	grains/lb	21.09	16.41	15.77	14.66	14.51
SatPres	kPa	98.62	98.72	98.72	98.74	98.74
Hum Factor		0.80	0.78	0.78	0.78	0.78
F_fac		0.98	0.98	0.98	0.99	0.99
K_fac		1.00	1.00	1.00	1.00	1.00
Humidity	g/kg	3.01	2.34	2.25	2.09	2.07
H2		0.52	0.20	0.17	0.04	0.26
WetDry Factor		0.84	0.84	0.86	0.85	0.86



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Modal Emissions Concentrations

ModeNum		1	2	3	4	5
THC	ppmC1	1431.22	728.07	600.74	980.09	7255.28
CO	%	1.18	0.47	0.39	0.10	0.59
N2O	ppm	0.54	3.28	1.84	2.62	0.00
CH4	ppm	210.50	70.85	27.91	26.25	123.23
CO2	%	11.58	11.89	10.31	11.38	10.40
O2	%	0.24	0.66	3.41	1.88	2.85
CNOx	ppm	1074.37	1761.58	1124.63	2227.38	35.13
AHC	ppm	32.20	14.98	6.94	16.24	147.48
C2H2	ppm	33.83	14.69	8.13	8.17	16.74
C2H4	ppm	164.69	95.39	109.01	100.19	170.05
C3H6	ppm	19.32	15.41	11.03	17.81	37.86
C4H6	ppm	9.42	2.58	0.60	2.40	3.87
ETOH	ppm	98.27	41.25	44.47	110.79	1477.00
H2O	%	16.19	15.71	13.55	14.54	13.76
HCHO	ppm	51.30	52.50	71.81	98.99	170.72
HCN	ppm	10.49	8.65	5.76	4.64	1.48
HNCO	ppm	6.89	6.52	9.23	4.69	0.00
MECHO	ppm	73.43	39.20	39.16	84.17	557.42
NC5	ppm	8.25	7.43	5.19	18.92	404.79
NH3	ppm	144.32	5.67	1.74	0.58	1.48
NO	ppm	1346.16	2243.96	1364.67	2844.15	31.40
NO2	ppm	0.51	2.73	61.20	15.02	13.69
Soot	mg/m3	1.13	0.49	0.03	0.02	0.02
AFR	:1	10.18	10.89	12.80	11.74	10.25



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Measurement Accuracy (SAE paper 961804)

	H2_XLS %	ModalHC_Dry %	ModalFTIR_H2O %	N2 %	Ar %	AFR :1	Tr_Eff -
1	0.624	0.171	16.187	85.484	0.988	14.888	0.988
2	0.239	0.086	15.706	86.106	0.995	15.684	0.967
3	0.193	0.069	13.555	85.416	0.987	18.185	0.829
4	0.051	0.115	14.540	85.642	0.990	16.905	0.905
5	0.298	0.841	13.763	84.067	0.972	16.460	0.856

	ModalWHC %	ModalC1 %	ModalC8 %	ModalSUM_HC %	ModalT_Emiss %	ModalError %
	167.637	-0.016	-0.002	-0.018	102.746	2.746
	38.465	-0.405	-0.051	-0.455	102.590	2.590
	25.046	-2.065	-0.258	-2.323	100.766	0.766
	24.525	-1.174	-0.147	-1.320	101.343	1.343
	45.664	-1.118	-0.140	-1.258	100.143	0.143

Power Run

Team 1

TeamNumber	1
TeamName	Clarkson
Model	Rotax
Engine	600 ACE

Displacement cc	600.00
RatedSpeed	7309
RatedTorque	50.7

