



Team Results for Clean Snowmobile Challenge 2017 Team 2



2017 Clean Snowmobile Competition - Lab Emission Event Emission Data Sheet

Test Date : 2017/03/08 09:49:46
Team Name : Clarkson
Team Number : 2
Model : Rotax
Engine : Rotax
Displacement[cc] : 600.00
100% Speed : 7998
100% Torque : 39.7
No of Strokes : 4
Fuel : Gasoline H/C: 2.38 O/C: 0.24

ModeNum	:	1	2	3	4	5	RMC
Weighting	:	0.12	0.27	0.25	0.31	0.05	1.00
Power kW	:	32.1	14.2	8.5	4.1	0.0	10.2
HC_m g/hr	:	42.35	0.28	12.12	30.37	16.80	6.64
CO_m g/hr	:	4866.97	0.36	868.31	1581.41	836.85	1392.06
NOx_m g/hr	:	0.94	195.99	0.02	0.02	0.02	41.99
Soot_m mg/hr	:	56.29	0.00	0.00	0.00	0.00	-0.48
N2O_m mg/hr	:	0.16	0.01	0.03	0.06	0.03	0.05
CO2_m g/hr	:	33220.20	18219.42	11919.99	6831.39	4820.83	14027.25
CH4_m g/hr	:	21.18	0.21	6.04	9.36	6.77	8.39
W_HC g/hr	:	5.08	0.08	3.03	9.42	0.84	6.64
W_CO g/hr	:	584.04	0.10	217.08	490.24	41.84	1392.06
W_NOx g/hr	:	0.11	52.92	0.01	0.01	0.00	41.99
W_HCNOx g/hr	:	5.19	52.99	3.04	9.42	0.84	48.63
W_Soot mg/hr	:	6.76	0.00	0.00	0.00	0.00	-0.48
W_N2O g/hr	:	0.02	0.00	0.01	0.02	0.00	0.05
W_CO2 g/hr	:	3986.42	4919.24	2980.00	2117.73	241.04	14027.25
W_CH4 g/hr	:	2.54	0.06	1.51	2.90	0.34	8.39

Total Weighted Power [kW] 11.079

Weighted Emissions

	HC	CO	NOx	HC+NOx
Total Mass [g/hr]	18.44	1333.29	53.04	71.49
Specific Mass [g/kW-hr]	1.66	120.34	4.79	6.45
BSFC [g/kW-hr]	526.1			

Total Soot [mg/hr] 6.76 Specific Soot [mg/kW-hr] 0.61

Not Used for Competition

Total N2O [mg/hr]	0.05	Specific N2O [mg/kW-hr]	0.00
Total CO2 [g/hr]	14244.44	Specific CO2 [g/kW-hr]	1285.72
Total CH4 [g/hr]	7.35	Specific CH4 [g/kW-hr]	0.66
RMC BSFC [g/kW-hr]	519.66		

EMISSION TESTS:

	Value	Limit	Result
Power	33.22	<96.94 kW	PASS
Soot	0.61	<50 mg/kW-hr	PASS
CO	120.34	<275 g/kW-hr	PASS
HC + NOX	6.45	<90 g/kW-hr	PASS
E-Score	175.61	>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	1200	1200	1200	1200	12031
PtsInMode	points	1210	3050	2720	3470	1480	12031
Speed	rpm	7995.44	6801.12	5998.35	5186.36	3845.76	5952.34
Torque	Nm	38.38	19.95	13.51	7.51	0.00	16.41
Power	kW	32.14	14.21	8.49	4.08	0.00	10.23
BSFC	g/kw-hr	417.67	419.91	513.91	755.36	**	519.66
Fuel	g/hr	13423.38	5965.99	4361.76	3080.72	2025.79	5315.69
T_int	degC	21.80	19.05	19.25	18.74	19.38	19.42
RelHumid	%	16.69	14.40	14.14	15.06	14.09	15.01
Baro	in Hg	29.02	29.02	29.02	29.02	29.02	29.02
Baro	mmHg	737.23	737.21	737.19	737.17	737.14	737.20
Pvap_kPa	kPa	0.37	0.27	0.27	0.28	0.27	0.29
Pvap_inHg	inHg	0.11	0.08	0.08	0.08	0.08	0.09
AbsHumidity	grains/lb	16.26	12.06	11.97	12.40	12.01	12.83
SatPres	kPa	97.92	98.01	98.01	98.00	98.01	98.00
Hum Factor		0.78	0.77	0.77	0.77	0.77	0.77
F_fac		1.00	1.00	1.00	1.00	1.00	1.00
K_fac		1.02	1.01	1.02	1.01	1.02	1.02
Humidity	g/kg	2.32	1.72	1.71	1.77	1.72	1.83
H2		1.15	0.00	0.59	1.77	1.37	0.78
WetDry Factor		0.85	0.84	0.84	0.84	0.85	1.00



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Modal Emissions Concentrations

ModeNum		1	2	3	4	5	RMC
THC	ppmC1	429.33	6.02	373.93	1369.24	1154.41	166.43
CO	%	2.54	0.00	1.38	3.67	2.96	1.80
N2O	ppm	5.38	0.95	2.65	8.87	6.04	4.38
CH4	ppm	193.44	3.97	167.85	380.13	418.91	189.35
CO2	%	11.03	12.82	12.04	10.08	10.85	11.51
O2	%	0.00	0.22	0.01	0.02	0.05	0.32
CNOx	ppm	2.99	1318.87	0.22	0.34	0.41	329.65
AHC	ppm	7.50	1.13	8.11	58.82	44.02	16.62
C2H2	ppm	1.08	1.03	0.92	1.02	0.99	1.04
C2H4	ppm	25.72	0.42	13.86	72.17	42.59	21.49
C3H6	ppm	0.42	0.55	0.16	10.01	5.14	2.13
C4H6	ppm	18.30	0.90	30.75	11.02	4.48	12.84
ETOH	ppm	3.17	0.19	2.42	1.28	0.50	1.61
H2O	%	15.38	16.23	15.68	15.86	15.08	0.00
HCHO	ppm	0.43	0.20	0.28	0.94	0.67	0.41
HCN	ppm	1.12	0.25	0.32	2.70	0.46	0.83
HNCO	ppm	8.28	2.59	12.54	5.02	2.96	6.11
MECHO	ppm	1.63	0.99	0.07	0.10	0.05	0.49
NC5	ppm	3.13	0.79	3.48	12.71	2.75	3.47
NH3	ppm	476.39	0.78	1115.14	275.50	110.93	389.14
NO	ppm	4.68	1701.54	0.50	0.42	0.49	425.51
NO2	ppm	0.41	6.42	0.16	0.32	0.36	1.60
Soot	mg/m3	0.34	0.00	0.00	0.00	0.00	-0.01
AFR	:1	10.10	11.34	10.56	9.47	9.82	10.63



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Measurement Accuracy (SAE paper 961804)

ModeNum	H2_XLS %	ModalHC_Dry %	ModalFTIR_H2O %	N2 %	Ar %	AFR :1	Tr_Eff -
1	1.360	0.051	15.383	82.676	0.956	13.977	1.000
2	0.000	0.001	16.235	88.491	1.023	15.499	0.989
3	0.696	0.044	15.675	85.357	0.987	14.564	0.999
4	2.103	0.163	15.858	82.294	0.951	13.340	0.999
5	1.612	0.136	15.080	82.257	0.951	13.748	0.998

ModeNum	ModalWHC %	ModalC1 %	ModalC8 %	ModalSUM_HC %	ModalT_Emiss %	ModalError %
1	42.345	0.051	0.006	0.057	101.082	1.082
2	0.280	-0.174	-0.022	-0.195	105.091	5.091
3	12.124	0.034	0.004	0.038	103.002	3.002
4	30.372	0.142	0.018	0.160	101.881	1.881
5	16.797	0.096	0.012	0.109	101.244	1.244

Power Run

Team 2

TeamNumber	2
TeamName	Clarkson
Model	Rotax
Engine	Rotax

Displacement cc	600.00
RatedSpeed	7998
RatedTorque	39.7

