



Team Results for Clean Snowmobile Challenge 2015 Team 1



2015 Clean Snowmobile Competition - Lab Emission Event Emission Data Sheet

Test Date : 2015/03/04 11:04:48
Team Name : Kettering
Team Number : 1
Model : Skidoo Rotax
Engine : 600ACE
Displacement[cc] : 600.00
100% Speed : 6534
100% Torque : 31.0
No of Strokes : 4
Fuel : GASOLINE H/C: 1.92 O/C: 0.03

ModeNum	:	1	2	3	4	5	RMC
Weighting	:	0.12	0.27	0.25	0.31	0.05	1.00
Power kW	:	24.1	8.4	5.3	2.7	0.0	6.1
HC_m g/hr	:	4.40	15.93	12.07	1.18	0.27	2.49
CO_m g/hr	:	7.59	4.33	10.63	0.15	0.01	6.14
NOx_m g/hr	:	389.62	141.41	70.37	15.39	1.60	77.93
Soot_m mg/hr	:	1.94	0.49	0.31	0.14	0.07	0.50
N2O_m mg/hr	:	0.06	0.03	0.02	0.01	0.00	0.02
CO2_m g/hr	:	21979.70	11000.87	8717.14	5657.10	2872.06	9480.91
CH4_m g/hr	:	0.69	0.59	0.40	0.53	0.14	0.59
W_HC g/hr	:	0.53	4.30	3.02	0.37	0.01	2.49
W_CO g/hr	:	0.91	1.17	2.66	0.05	0.00	6.14
W_NOx g/hr	:	46.75	38.18	17.59	4.77	0.08	77.93
W_HCNOx g/hr	:	47.28	42.48	20.61	5.14	0.09	80.42
W_Soot mg/hr	:	0.23	0.13	0.08	0.04	0.00	0.50
W_N2O g/hr	:	0.01	0.01	0.00	0.00	0.00	0.02
W_CO2 g/hr	:	2637.56	2970.23	2179.29	1753.70	143.60	9480.91
W_CH4 g/hr	:	0.08	0.16	0.10	0.17	0.01	0.59

Total Weighted Power [kW] 7.319

Weighted Emissions

	HC	CO	NOx	HC+NOx
Total Mass [g/hr]	8.23	4.79	107.38	115.61
Specific Mass [g/kW-hr]	1.12	0.65	14.67	15.79
BSFC [g/kW-hr]	486.8			

Total Soot [mg/hr] 0.49 Specific Soot [mg/kW-hr] 0.07

Not Used for Competition

Total N2O [mg/hr]	0.02	Specific N2O [mg/kW-hr]	0.00
Total CO2 [g/hr]	9684.39	Specific CO2 [g/kW-hr]	1323.14
Total CH4 [g/hr]	0.52	Specific CH4 [g/kW-hr]	0.07
RMC BSFC [g/kW-hr]	493.44		

EMISSION TESTS:

	Value	Limit	Result
Power	21.22	<96.94 kW	PASS
Soot	0.07	<100 mg/kW-hr	PASS
CO	0.65	<275 g/kW-hr	PASS
HC + NOX	15.79	<90 g/kW-hr	PASS
E-Score	199.31	>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	RMC
Total Points	points	600	1200	1200	1200	1200	12031
PtsInMode	points	1210	3050	2720	3470	1480	12031
Speed	rpm	6533.12	5545.30	4902.51	4239.72	1923.25	4798.02
Torque	Nm	35.25	14.46	10.39	5.99	0.00	12.14
Power	kW	24.12	8.40	5.33	2.66	0.00	6.10
BSFC	g/kw-hr	289.25	417.46	521.31	674.29	**	493.44
Fuel	g/hr	6975.35	3505.17	2780.54	1794.46	910.67	3010.83
T_int	degC	5.75	13.05	4.86	5.32	2.91	8.01
RelHumid	%	14.58	11.72	11.38	14.54	15.33	13.18
Baro	in Hg	28.81	28.81	28.81	28.81	28.81	28.81
Baro	mmHg	731.77	731.83	731.81	731.76	731.85	731.78
Pvap_kPa	kPa	0.13	0.16	0.09	0.12	0.11	0.13
Pvap_inHg	inHg	0.04	0.05	0.03	0.04	0.03	0.04
AbsHumidity	grains/lb	5.69	7.04	4.20	5.52	5.02	5.89
SatPres	kPa	97.43	97.41	97.47	97.44	97.46	97.43
Hum Factor		0.75	0.76	0.75	0.75	0.75	0.75
F_fac		0.97	0.99	0.97	0.97	0.96	0.98
K_fac		1.00	1.01	1.00	1.00	0.99	1.00
Humidity	g/kg	0.81	1.01	0.60	0.79	0.72	0.84
H2		0.00	0.00	0.01	0.00	0.00	0.00
WetDry Factor		0.88	0.89	0.89	0.89	0.87	1.00



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Modal Emissions Concentrations

ModeNum		1	2	3	4	5	RMC
THC	ppmC1	73.87	515.06	487.54	74.70	38.22	91.40
CO	%	0.01	0.01	0.02	0.00	0.00	0.01
N2O	ppm	3.12	2.63	1.97	1.49	0.59	2.28
CH4	ppm	10.04	16.69	14.18	29.54	17.00	18.96
CO2	%	11.70	11.27	11.16	11.38	12.92	11.05
O2	%	2.89	3.52	3.72	3.45	1.10	4.41
CNOx	ppm	1983.85	1386.41	861.91	296.11	68.80	868.80
AHC	ppm	0.22	0.00	0.00	0.00	0.00	1.33
C2H2	ppm	0.57	0.28	1.07	0.35	0.37	0.67
C2H4	ppm	12.21	29.04	27.99	5.91	0.48	19.46
C3H6	ppm	1.52	12.90	9.62	0.29	0.30	5.54
C4H6	ppm	0.60	0.34	0.50	0.35	0.52	0.48
ETOH	ppm	0.28	0.06	0.23	0.22	0.66	0.25
H2O	%	11.63	11.16	11.04	11.26	12.79	0.00
HCHO	ppm	3.69	17.80	16.41	0.71	0.34	9.15
HCN	ppm	0.90	0.84	1.06	0.48	0.60	0.88
HNCO	ppm	2.73	2.18	2.14	1.95	1.99	2.08
MECHO	ppm	1.20	3.09	2.17	0.75	0.38	2.20
NC5	ppm	1.23	54.09	59.74	3.74	3.67	26.26
NH3	ppm	0.26	0.27	0.22	0.24	0.13	0.25
NO	ppm	2575.02	1777.09	1107.20	376.42	87.44	1116.29
NO2	ppm	55.08	52.18	43.75	16.75	4.00	35.41
Soot	mg/m3	0.02	0.01	0.01	0.01	0.01	0.01
AFR	:1	16.39	16.79	16.96	16.86	14.79	17.78



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Measurement Accuracy (SAE paper 961804)

ModeNum	H2_XLS %	ModalHC_Dry %	ModalFTIR_H2O %	N2 %	Ar %	AFR :1	Tr_Eff -
1	0.002	0.008	11.629	83.613	0.966	17.182	0.854
2	0.003	0.058	11.164	83.126	0.961	17.727	0.823
3	0.008	0.055	11.035	83.041	0.960	17.896	0.813
4	0.000	0.008	11.258	83.161	0.961	17.646	0.827
5	0.000	0.004	12.791	83.615	0.967	15.485	0.944

ModeNum	ModalWHC %	ModalC1 %	ModalC8 %	ModalSUM_HC %	ModalT_Emiss %	ModalError %
1	4.399	-1.922	-0.240	-2.163	99.233	0.767
2	15.931	-2.203	-0.275	-2.478	98.481	1.519
3	12.071	-2.308	-0.288	-2.596	98.294	1.706
4	1.177	-2.217	-0.277	-2.494	98.377	1.623
5	0.269	-0.822	-0.103	-0.925	99.744	0.256

Power Run

Team 1

TeamNumber	1
TeamName	Kettering
Model	Skidoo Rotax
Engine	600ACE

Displacement cc	600.00
RatedSpeed	6534
RatedTorque	31.0

