



Team Results for Clean Snowmobile Challenge 2015 Team 16



2015 Clean Snowmobile Competition - Lab Emission Event Emission Data Sheet

Test Date : 2015/03/06 13:24:32
Team Name : Clarkson
Team Number : 16
Model : Skidoo
Engine : Rotax
Displacement[cc] : 600.00
100% Speed : 6026
100% Torque : 55.7
No of Strokes : 4
Fuel : GASOLINE H/C: 1.92 O/C: 0.03

ModeNum	:	1	2	3	4	5
Weighting	:	0.12	0.27	0.25	0.31	0.05
Power kW	:	33.8	15.3	8.9	4.0	0.0
HC_m g/hr	:	25.47	304.87	560.25	424.54	7.54
CO_m g/hr	:	1784.85	14208.90	11585.50	7033.95	387.79
NOx_m g/hr	:	15.90	0.23	0.07	0.04	0.01
Soot_m mg/hr	:	1257.25	1458.02	4321.15	3288.28	3.02
N2O_m mg/hr	:	0.05	0.37	0.30	0.21	0.01
CO2_m g/hr	:	33235.06	10363.42	8582.72	6537.18	2149.14
CH4_m g/hr	:	12.23	115.77	147.00	95.43	4.36
W_HC g/hr	:	3.06	82.31	140.06	131.61	0.38
W_CO g/hr	:	214.18	3836.40	2896.38	2180.52	19.39
W_NOx g/hr	:	1.91	0.06	0.02	0.01	0.00
W_HCN0x g/hr	:	4.96	82.38	140.08	131.62	0.38
W_Soot mg/hr	:	150.87	393.66	1080.29	1019.37	0.15
W_N2O g/hr	:	0.01	0.10	0.07	0.06	0.00
W_CO2 g/hr	:	3988.21	2798.12	2145.68	2026.52	107.46
W_CH4 g/hr	:	1.47	31.26	36.75	29.58	0.22

Total Weighted Power [kW] 11.635

Weighted Emissions

	HC	CO	NOx	HC+NOx
Total Mass [g/hr]	357.42	9146.88	2.00	359.42
Specific Mass [g/kW-hr]	30.72	786.15	0.17	30.89
BSFC [g/kW-hr]	950.6			

Total Soot [mg/hr] 2644.34 Specific Soot [mg/kW-hr] 227.27

Not Used for Competition

Total N2O [mg/hr]	0.24	Specific N2O [mg/kW-hr]	0.02
Total CO2 [g/hr]	11065.99	Specific CO2 [g/kW-hr]	951.09
Total CH4 [g/hr]	99.28	Specific CH4 [g/kW-hr]	8.53
RMC BSFC [g/kW-hr]			

EMISSION TESTS:

	Value	Limit	Result
Power	35.14	<96.94 kW	PASS
Soot	227.27	<100 mg/kW-hr	FAIL
CO	786.15	<275 g/kW-hr	FAIL
HC + NOX	30.89	<90 g/kW-hr	PASS
E-Score	-7.13	>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	600	300	300	300	600
PtsInMode	points	1210	600	600	600	700
Speed	rpm	6025.20	5121.59	4500.35	3931.33	1838.75
Torque	Nm	53.63	28.46	18.81	9.69	0.00
Power	kW	33.84	15.26	8.86	3.99	0.00
BSFC	g/kw-hr	338.34	698.88	1021.00	1503.34	**
Fuel	g/hr	11449.34	10666.64	9050.99	5999.97	881.92
T_int	degC	5.17	38.78	44.33	39.47	35.59
RelHumid	%	18.57	19.92	19.75	19.64	19.26
Baro	in Hg	28.73	28.73	28.73	28.73	28.73
Baro	mmHg	729.74	729.77	729.76	729.73	729.74
Pvap_kPa	kPa	0.16	1.04	1.34	1.06	0.86
Pvap_inHg	inHg	0.05	0.31	0.40	0.31	0.25
AbsHumidity	grains/lb	7.01	47.15	61.11	48.06	38.91
SatPres	kPa	97.13	96.25	95.94	96.23	96.43
Hum Factor		0.76	0.88	0.94	0.89	0.85
F_fac		0.97	1.06	1.08	1.06	1.05
K_fac		1.00	1.06	1.07	1.06	1.05
Humidity	g/kg	1.00	6.74	8.73	6.87	5.56
H2		0.36	6.54	6.62	5.66	1.19
WetDry Factor		0.87	0.89	0.89	0.89	0.89



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Modal Emissions Concentrations

ModeNum		1	2	3	4	5
THC	ppmC1	306.56	4784.00	10963.71	12423.27	1237.14
CO	%	1.07	11.10	11.29	10.25	3.17
N2O	ppm	2.05	18.21	18.39	19.27	6.54
CH4	ppm	128.39	1583.95	2508.26	2434.94	623.50
CO2	%	12.68	5.15	5.32	6.06	11.17
O2	%	0.00	0.00	0.00	0.00	0.50
CNOx	ppm	58.05	1.10	0.40	0.34	0.51
AHC	ppm	7.14	156.30	211.29	303.82	30.64
C2H2	ppm	8.03	69.07	59.20	34.85	1.14
C2H4	ppm	18.66	278.05	236.38	273.71	3.35
C3H6	ppm	0.05	84.50	120.23	121.02	1.11
C4H6	ppm	12.86	5.14	3.87	2.79	1.89
ETOH	ppm	5.26	3.93	2.86	1.26	1.83
H2O	%	13.34	11.42	10.55	11.02	11.05
HCHO	ppm	0.43	3.18	21.14	19.76	1.08
HCN	ppm	5.33	19.26	6.42	5.48	0.83
HNCO	ppm	6.27	0.00	0.04	0.19	1.37
MECHO	ppm	0.00	2.75	0.00	0.00	0.00
NC5	ppm	1.86	58.99	475.71	529.34	14.06
NH3	ppm	334.52	67.56	67.42	69.43	74.18
NO	ppm	75.69	0.25	0.00	0.00	0.02
NO2	ppm	0.92	1.02	1.06	1.07	0.92
Soot	mg/m3	8.72	16.11	57.89	64.00	0.28
AFR	:1	13.42	8.31	7.57	7.76	12.61



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Measurement Accuracy (SAE paper 961804)

ModeNum	H2_XLS %	ModalHC_Dry %	ModalFTIR_H2O %	N2 %	Ar %	AFR :1	Tr_Eff -
1	0.418	0.035	13.337	81.558	0.943	14.118	1.000
2	7.380	0.540	11.419	66.206	0.765	9.185	1.000
3	7.401	1.226	10.554	65.257	0.754	8.903	1.000
4	6.357	1.396	11.016	67.268	0.778	9.282	1.000
5	1.339	0.139	11.054	76.005	0.879	13.423	0.975

ModeNum	ModalWHC %	ModalC1 %	ModalC8 %	ModalSUM_HC %	ModalT_Emiss %	ModalError %
1	25.466	0.035	0.004	0.040	98.836	1.164
2	304.867	0.540	0.068	0.608	93.315	6.685
3	560.251	1.225	0.153	1.378	93.368	6.632
4	424.540	1.396	0.175	1.571	94.309	5.691
5	7.542	-0.275	-0.034	-0.310	94.599	5.401

Power Run

Team 16

TeamNumber	16
TeamName	Clarkson
Model	Skidoo
Engine	Rotax

Displacement cc	600.00
RatedSpeed	6026
RatedTorque	55.7

