



Team Results for Clean Snowmobile Challenge 2015 Team 5



2015 Clean Snowmobile Competition - Lab Emission Event Emission Data Sheet

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Test Date       : 2015/03/06 15:58:34
Team Name      : ETS
Team Number    : 5
Model         : Skidoo
Engine        : 600ACE
Displacement[cc] : 600.00
100% Speed    : 7018
100% Torque   : 69.1
No of Strokes : 4
Fuel          : GASOLINE           H/C: 1.92       O/C: 0.03
  
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ModeNum	:	1	2	3	4	5	RMC
Weighting	:	0.12	0.27	0.25	0.31	0.05	1.00
Power kW	:	38.6	20.7	13.5	5.4	0.0	14.0
HC_m g/hr	:	66.65	1.44	0.26	0.02	0.26	1.38
CO_m g/hr	:	13779.05	1.81	0.34	0.05	0.03	642.84
NOx_m g/hr	:	10.25	356.33	220.98	30.44	2.78	144.15
Soot_m mg/hr	:	343.08	26.27	12.66	5.68	0.30	35.55
N2O_m mg/hr	:	0.41	0.06	0.05	0.01	0.00	0.06
CO2_m g/hr	:	28574.49	19720.62	13773.58	7909.06	2195.91	16497.74
CH4_m g/hr	:	34.65	0.97	0.35	0.12	0.10	2.13
W_HC g/hr	:	8.00	0.39	0.06	0.01	0.01	1.38
W_CO g/hr	:	1653.49	0.49	0.09	0.02	0.00	642.84
W_NOx g/hr	:	1.23	96.21	55.24	9.44	0.14	144.15
W_HCNOx g/hr	:	9.23	96.60	55.31	9.44	0.15	145.53
W_Soot mg/hr	:	41.17	7.09	3.17	1.76	0.01	35.55
W_N2O g/hr	:	0.05	0.02	0.01	0.00	0.00	0.06
W_CO2 g/hr	:	3428.94	5324.57	3443.39	2451.81	109.80	16497.74
W_CH4 g/hr	:	4.16	0.26	0.09	0.04	0.00	2.13

Total Weighted Power [kW] 15.255

Weighted Emissions

	HC	CO	NOx	HC+NOx
Total Mass [g/hr]	8.47	1654.08	162.26	170.73
Specific Mass [g/kW-hr]	0.56	108.43	10.64	11.19
BSFC [g/kW-hr]	357.3			

Total Soot [mg/hr] 53.20 Specific Soot [mg/kW-hr] 3.49

Not Used for Competition

Total N2O [mg/hr]	0.08	Specific N2O [mg/kW-hr]	0.01
Total CO2 [g/hr]	14758.50	Specific CO2 [g/kW-hr]	967.46
Total CH4 [g/hr]	4.55	Specific CH4 [g/kW-hr]	0.30
RMC BSFC [g/kW-hr]	396.57		

EMISSION TESTS:

	Value	Limit	Result
Power	50.77	<96.94 kW	PASS
Soot	3.49	<100 mg/kW-hr	PASS
CO	108.43	<275 g/kW-hr	PASS
HC + NOX	11.19	<90 g/kW-hr	PASS
E-Score	175.43	>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	12032
PtsInMode	points	1210	3050	2720	3470	1480	12032
Speed	rpm	7016.63	5846.24	5263.48	4471.40	1377.03	5166.45
Torque	Nm	52.58	33.81	24.46	11.44	0.00	25.87
Power	kW	38.64	20.70	13.48	5.36	0.00	14.00
BSFC	g/kw-hr	413.79	302.14	323.91	468.10	**	396.57
Fuel	g/hr	15986.91	6253.43	4366.41	2507.08	696.33	5551.04
T_int	degC	4.76	3.00	2.53	1.11	6.20	2.07
RelHumid	%	21.27	19.13	18.40	18.97	20.93	19.29
Baro	in Hg	28.73	28.72	28.72	28.73	28.73	28.73
Baro	mmHg	729.68	729.58	729.58	729.65	729.65	729.63
Pvap_kPa	kPa	0.17	0.14	0.13	0.12	0.19	0.13
Pvap_inHg	inHg	0.05	0.04	0.04	0.04	0.06	0.04
AbsHumidity	grains/lb	7.84	6.32	5.91	5.57	8.42	6.02
SatPres	kPa	97.11	97.13	97.14	97.15	97.09	97.14
Hum Factor		0.76	0.76	0.75	0.75	0.76	0.76
F_fac		0.97	0.97	0.97	0.96	0.97	0.96
K_fac		1.00	1.00	1.00	0.99	1.00	0.99
Humidity	g/kg	1.12	0.90	0.84	0.80	1.20	0.86
H2		2.91	0.00	0.00	0.00	0.00	0.25
WetDry Factor		0.87	0.87	0.88	0.88	0.87	1.00



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Modal Emissions Concentrations

ModeNum		1	2	3	4	5	RMC
THC	ppmC1	627.23	30.86	7.36	1.21	47.12	32.36
CO	%	6.46	0.00	0.00	0.00	0.00	0.75
N2O	ppm	12.30	4.29	4.35	1.70	0.13	4.27
CH4	ppm	284.30	18.01	8.69	5.06	15.95	43.48
CO2	%	8.52	13.35	12.40	12.19	12.85	12.25
O2	%	0.00	0.24	1.72	2.05	0.98	1.18
CNOx	ppm	29.26	2307.72	1903.48	448.82	155.81	1023.52
AHC	ppm	16.37	0.21	0.01	0.06	0.00	2.23
C2H2	ppm	4.56	1.03	0.68	0.63	0.79	1.31
C2H4	ppm	42.39	1.61	1.17	0.56	0.91	5.90
C3H6	ppm	6.26	0.91	0.49	0.48	0.75	1.20
C4H6	ppm	6.44	0.53	0.32	0.24	0.17	2.44
ETOH	ppm	4.05	1.55	1.99	1.71	2.02	2.62
H2O	%	12.89	13.29	12.31	12.10	13.04	0.00
HCHO	ppm	0.57	0.75	0.37	0.17	0.71	0.41
HCN	ppm	13.21	0.79	0.64	0.48	0.48	3.05
HNCO	ppm	2.05	0.79	1.30	1.18	0.80	1.81
MECHO	ppm	0.04	0.00	0.00	0.00	0.00	0.01
NC5	ppm	3.02	1.13	1.13	1.20	7.30	2.97
NH3	ppm	164.25	3.79	0.61	1.06	0.29	60.53
NO	ppm	37.58	3047.45	2480.71	579.65	201.59	1342.88
NO2	ppm	0.92	2.41	40.93	15.62	2.62	12.38
Soot	mg/m3	2.04	0.32	0.20	0.16	0.03	0.48
AFR	:1	11.02	14.23	15.38	15.60	14.70	14.53



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Measurement Accuracy (SAE paper 961804)

ModeNum	H2_XLS %	ModalHC_Dry %	ModalFTIR_H2O %	N2 %	Ar %	AFR :1	Tr_Eff -
1	3.336	0.072	12.891	74.181	0.857	11.619	1.000
2	0.001	0.004	13.287	83.661	0.967	14.928	0.988
3	0.000	0.001	12.309	83.343	0.963	16.115	0.913
4	0.000	0.000	12.098	82.872	0.958	16.327	0.897
5	0.000	0.005	13.039	83.482	0.965	15.402	0.950

ModeNum	ModalWHC %	ModalC1 %	ModalC8 %	ModalSUM_HC %	ModalT_Emiss %	ModalError %
1	66.645	0.072	0.009	0.081	95.661	4.339
2	1.445	-0.181	-0.023	-0.204	100.448	0.448
3	0.259	-1.230	-0.154	-1.384	99.316	0.684
4	0.025	-1.433	-0.179	-1.613	98.480	1.520
5	0.255	-0.732	-0.091	-0.823	99.558	0.442

Power Run

Team 5

TeamNumber	5
TeamName	ETS
Model	Skidoo
Engine	600ACE

Displacement cc	600.00
RatedSpeed	7018
RatedTorque	69.1

