



Team Results for Clean Snowmobile Challenge 2016 Team 1



2016 Clean Snowmobile Competition - Lab Emission Event Emission Data Sheet

Test Date : 2016/03/09 12:57:31
Team Name : Madison
Team Number : 1
Model : skidoo
Engine : ACE600
Displacement[cc] : 670.00
100% Speed : 6246
100% Torque : 45.4
No of Strokes : 4
Fuel : GASOLINE H/C: 2.00 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	:	29.7	12.8	7.3	3.9	0.0	8.8
HC_m g/hr	:	1.72	2.36	3.42	4.09	0.54	1.04
CO_m g/hr	:	1.36	1.19	0.56	0.57	0.03	5.53
NOx_m g/hr	:	436.22	73.10	19.60	6.57	1.15	46.97
Soot_m mg/hr	:	100.48	4.49	0.10	0.11	0.01	6.91
N2O_m mg/hr	:	0.06	0.01	0.01	0.00	0.00	0.01
CO2_m g/hr	:	26021.56	14097.29	10248.73	8281.62	4801.53	12005.29
CH4_m g/hr	:	1.47	1.19	1.52	1.67	0.53	1.52
W_HC g/hr	:	0.21	0.64	0.85	1.27	0.03	1.04
W_CO g/hr	:	0.16	0.32	0.14	0.18	0.00	5.53
W_NOx g/hr	:	52.35	19.74	4.90	2.04	0.06	46.97
W_HCNOx g/hr	:	52.55	20.37	5.76	3.30	0.08	48.01
W_Soot mg/hr	:	12.06	1.21	0.03	0.03	0.00	6.91
W_N2O g/hr	:	0.01	0.00	0.00	0.00	0.00	0.01
W_CO2 g/hr	:	3122.59	3806.27	2562.18	2567.30	240.08	12005.29
W_CH4 g/hr	:	0.18	0.32	0.38	0.52	0.03	1.52

Total Weighted Power [kW] 10.080

Weighted Emissions

	HC	CO	NOx	HC+NOx
Total Mass [g/hr]	2.99	0.80	79.08	82.07
Specific Mass [g/kW-hr]	0.30	0.08	7.85	8.14
BSFC [g/kW-hr]	447.6			

Total Soot [mg/hr] 13.33 Specific Soot [mg/kW-hr] 1.32

Not Used for Competition

Total N2O [mg/hr]	0.01	Specific N2O [mg/kW-hr]	0.00
Total CO2 [g/hr]	12298.42	Specific CO2 [g/kW-hr]	1220.12
Total CH4 [g/hr]	1.42	Specific CH4 [g/kW-hr]	0.14
RMC BSFC [g/kW-hr]	435.82		

EMISSION TESTS:

	Value	Limit	Result
Power	29.73	<96.94 kW	PASS
Soot	1.32	<50 mg/kW-hr	PASS
CO	0.08	<275 g/kW-hr	PASS
HC + NOX	8.14	<90 g/kW-hr	PASS
E-Score	204.55	>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	12032
PtsInMode	points	1210	3050	2720	3470	1480	12032
Speed	rpm	6245.51	5308.54	4684.71	4054.74	1937.83	4638.57
Torque	Nm	45.41	23.05	14.96	9.28	0.00	18.09
Power	kW	29.70	12.81	7.34	3.94	0.00	8.79
BSFC	g/kw-hr	279.30	350.90	445.38	670.91	**	435.82
Fuel	g/hr	8294.88	4495.44	3269.74	2643.54	1530.70	3829.62
T_int	degC	22.61	18.89	22.76	19.60	21.32	20.69
RelHumid	%	42.67	40.33	40.15	40.04	40.51	40.84
Baro	in Hg	28.76	28.75	28.76	28.75	28.76	28.75
Baro	mmHg	730.42	730.26	730.42	730.38	730.50	730.36
Pvap_kPa	kPa	0.98	0.75	0.93	0.78	0.86	0.84
Pvap_inHg	inHg	0.29	0.22	0.27	0.23	0.26	0.25
AbsHumidity	grains/lb	44.12	33.95	41.82	35.07	39.00	37.99
SatPres	kPa	96.40	96.61	96.45	96.60	96.53	96.53
Hum Factor		0.87	0.84	0.87	0.84	0.86	0.85
F_fac		1.02	1.01	1.02	1.01	1.02	1.02
K_fac		1.03	1.02	1.03	1.03	1.03	1.03
Humidity	g/kg	6.30	4.85	5.97	5.01	5.57	5.43
H2		0.00	0.00	0.00	0.00	0.00	0.00
WetDry Factor		0.86	0.87	0.87	0.87	0.87	1.00



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Modal Emissions Concentrations

ModeNum		1	2	3	4	5	RMC
THC	ppmC1	26.86	63.52	125.59	185.55	45.84	32.95
CO	%	0.00	0.00	0.00	0.00	0.00	0.01
N2O	ppm	2.78	0.89	0.61	0.43	0.16	0.86
CH4	ppm	20.07	28.00	48.81	66.56	39.11	42.49
CO2	%	12.95	12.09	12.00	11.98	12.92	12.17
O2	%	0.56	1.92	2.07	2.11	0.76	2.06
CNOx	ppm	2076.96	599.73	219.60	90.97	29.53	455.43
AHC	ppm	0.01	0.04	0.01	0.00	0.06	0.06
C2H2	ppm	0.87	0.92	0.98	0.91	0.96	0.94
C2H4	ppm	1.77	9.94	13.26	7.72	0.42	8.49
C3H6	ppm	0.65	0.83	1.12	2.17	0.74	1.31
C4H6	ppm	1.10	0.69	0.55	0.59	0.57	0.85
ETOH	ppm	1.70	2.76	0.75	2.52	0.36	2.09
H2O	%	13.69	12.70	12.57	12.66	13.19	0.00
HCHO	ppm	0.84	1.82	2.07	3.06	0.19	2.10
HCN	ppm	0.49	0.39	0.39	0.34	0.32	0.41
HNCO	ppm	1.30	0.71	0.59	0.69	0.63	0.82
MECHO	ppm	0.08	0.16	0.05	0.10	0.02	0.11
NC5	ppm	0.60	2.22	6.54	14.35	2.16	5.15
NH3	ppm	1.08	0.03	0.00	0.13	0.01	4.02
NO	ppm	2352.09	696.06	247.13	104.60	32.95	523.18
NO2	ppm	26.35	18.75	6.36	3.44	1.57	11.24
Soot	mg/m3	0.90	0.07	0.00	0.00	0.00	0.12
AFR	:1	14.57	15.60	15.69	15.69	14.64	15.69



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Measurement Accuracy (SAE paper 961804)

ModeNum	H2_XLS %	ModalHC_Dry %	ModalFTIR_H2O %	N2 %	Ar %	AFR :1	Tr_Eff -
1	0.000	0.003	13.687	84.222	0.974	15.262	0.971
2	0.001	0.007	12.701	83.503	0.965	16.333	0.903
3	0.000	0.014	12.573	83.320	0.963	16.438	0.895
4	0.000	0.021	12.663	83.585	0.966	16.456	0.894
5	0.000	0.005	13.193	83.191	0.962	15.326	0.961

ModeNum	ModalWHC %	ModalC1 %	ModalC8 %	ModalSUM_HC %	ModalT_Emiss %	ModalError %
1	1.720	-0.426	-0.053	-0.479	100.651	0.651
2	2.360	-1.341	-0.168	-1.508	99.099	0.901
3	3.418	-1.424	-0.178	-1.602	98.808	1.192
4	4.087	-1.441	-0.180	-1.621	99.075	0.925
5	0.543	-0.572	-0.072	-0.644	99.278	0.722

Power Run

Team 1

TeamNumber	1
TeamName	Madison
Model	skidoo
Engine	ACE600

Displacement cc	670.00
RatedSpeed	6246
RatedTorque	45.4

