



Team Results for Clean Snowmobile Challenge 2016 Team 11



2016 Clean Snowmobile Competition - Lab Emission Event Emission Data Sheet

Test Date : 2016/03/09 11:32:04
Team Name : Clarkson
Team Number : 11
Model : skidoo
Engine : ACE600
Displacement[cc] : 600.00
100% Speed : 7039
100% Torque : 37.0
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	:	27.5	11.9	6.8	1.3	0.0	6.6
HC_m g/hr	:	31.85	1.39	0.00	0.00	0.00	0.56
CO_m g/hr	:	3932.64	228.95	1.38	0.90	9.24	203.93
NOx_m g/hr	:	1.96	0.26	38.03	0.34	0.12	16.11
Soot_m mg/hr	:	13.64	0.02	0.00	0.03	0.02	0.68
N2O_m mg/hr	:	0.10	0.01	0.01	0.00	0.00	0.01
CO2_m g/hr	:	21239.86	11816.59	8044.52	2297.47	2072.74	8643.36
CH4_m g/hr	:	8.86	0.98	0.01	0.01	0.02	0.55
W_HC g/hr	:	3.82	0.37	0.00	0.00	0.00	0.56
W_CO g/hr	:	471.92	61.82	0.35	0.28	0.46	203.93
W_NOx g/hr	:	0.24	0.07	9.51	0.11	0.01	16.11
W_HCNOx g/hr	:	4.06	0.44	9.51	0.11	0.01	16.67
W_Soot mg/hr	:	1.64	0.01	0.00	0.01	0.00	0.68
W_N2O g/hr	:	0.01	0.00	0.00	0.00	0.00	0.01
W_CO2 g/hr	:	2548.78	3190.48	2011.13	712.22	103.64	8643.36
W_CH4 g/hr	:	1.06	0.26	0.00	0.00	0.00	0.55

Total Weighted Power [kW] 8.614

Weighted Emissions

	HC	CO	NOx	HC+NOx
Total Mass [g/hr]	4.20	534.82	9.92	14.12
Specific Mass [g/kW-hr]	0.49	62.09	1.15	1.64
BSFC [g/kW-hr]	395.0			

Total Soot [mg/hr] 1.65 Specific Soot [mg/kW-hr] 0.19

Not Used for Competition

Total N2O [mg/hr]	0.01	Specific N2O [mg/kW-hr]	0.00
Total CO2 [g/hr]	8566.25	Specific CO2 [g/kW-hr]	994.42
Total CH4 [g/hr]	1.33	Specific CH4 [g/kW-hr]	0.15
RMC BSFC [g/kW-hr]	429.72		

EMISSION TESTS:

	Value	Limit	Result
Power	27.29	<96.94 kW	PASS
Soot	0.19	<50 mg/kW-hr	PASS
CO	62.09	<275 g/kW-hr	PASS
HC + NOX	1.64	<90 g/kW-hr	PASS
E-Score	193.39	>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	7038.16	5983.01	5274.40	1790.98	1507.88	4336.81
Torque	Nm	37.36	18.96	12.31	6.95	0.00	14.64
Power	kW	27.53	11.88	6.80	1.30	0.00	6.65
BSFC	g/kw-hr	318.52	326.79	377.27	562.00	**	429.72
Fuel	g/hr	8769.64	3881.70	2564.30	732.60	665.16	2857.11
T_int	degC	20.13	21.11	20.12	19.67	19.19	20.17
RelHumid	%	40.47	38.58	40.53	36.69	40.37	38.93
Baro	in Hg	28.73	28.74	28.73	28.73	28.73	28.73
Baro	mmHg	729.77	729.89	729.78	729.79	729.80	729.81
Pvap_kPa	kPa	0.81	0.81	0.81	0.71	0.77	0.78
Pvap_inHg	inHg	0.24	0.24	0.24	0.21	0.23	0.23
AbsHumidity	grains/lb	36.53	36.73	36.58	32.25	34.58	35.21
SatPres	kPa	96.48	96.50	96.48	96.58	96.53	96.52
Hum Factor		0.85	0.85	0.85	0.83	0.84	0.84
F_fac		1.01	1.02	1.01	1.01	1.01	1.01
K_fac		1.03	1.03	1.03	1.03	1.03	1.03
Humidity	g/kg	5.22	5.25	5.23	4.61	4.94	5.03
H2		1.34	0.14	0.00	0.00	0.02	0.15
WetDry Factor		0.87	0.86	0.86	0.93	0.91	1.00



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Modal Emissions Concentrations

ModeNum		1	2	3	4	5	RMC
THC	ppmC1	552.37	50.93	0.00	0.00	0.18	23.88
CO	%	3.42	0.42	0.00	0.00	0.06	0.43
N2O	ppm	5.34	0.62	0.92	0.33	0.33	1.09
CH4	ppm	134.63	31.54	0.32	0.73	2.49	20.52
CO2	%	11.74	13.85	13.99	7.46	8.95	11.73
O2	%	0.00	0.00	0.07	9.84	7.50	3.25
CNOx	ppm	10.39	2.86	632.74	10.66	4.97	209.15
AHC	ppm	27.22	0.07	0.00	0.28	0.16	3.59
C2H2	ppm	1.77	1.35	1.05	0.89	0.89	1.16
C2H4	ppm	16.87	0.00	0.30	0.31	0.26	2.07
C3H6	ppm	0.21	0.00	0.42	0.35	0.41	0.26
C4H6	ppm	27.47	23.53	0.67	0.26	0.21	9.02
ETOH	ppm	11.12	6.68	0.37	3.05	0.31	4.51
H2O	%	12.71	13.67	13.91	7.46	8.95	0.00
HCHO	ppm	0.19	0.05	0.08	0.04	0.05	0.11
HCN	ppm	3.24	0.92	0.83	0.29	0.39	0.97
HNCO	ppm	9.67	9.38	1.46	0.98	0.93	4.01
MECHO	ppm	0.00	0.03	0.12	0.03	0.15	0.05
NC5	ppm	9.78	0.53	0.02	0.06	0.00	1.37
NH3	ppm	1008.61	694.39	2.79	4.07	8.65	286.62
NO	ppm	12.44	3.21	741.80	12.51	5.65	246.80
NO2	ppm	0.08	0.29	5.21	0.33	0.28	1.50
Soot	mg/m3	0.13	0.00	0.00	0.00	0.00	0.02
AFR	:1	12.54	13.90	14.16	26.60	21.95	16.41



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Measurement Accuracy (SAE paper 961804)

ModeNum	H2_XLS %	ModalHC_Dry %	ModalFTIR_H2O %	N2 %	Ar %	AFR :1	Tr_Eff -
1	1.533	0.063	12.715	80.959	0.936	13.215	1.000
2	0.166	0.006	13.673	86.006	0.994	14.555	1.000
3	0.001	0.000	13.915	86.810	1.003	14.821	0.997
4	0.002	0.000	7.460	83.448	0.965	27.702	0.515
5	0.023	0.000	8.947	83.957	0.970	22.890	0.627

ModeNum	ModalWHC %	ModalC1 %	ModalC8 %	ModalSUM_HC %	ModalT_Emiss %	ModalError %
1	31.849	0.063	0.008	0.071	100.862	0.862
2	1.385	0.006	0.001	0.007	103.701	3.701
3	0.000	**	**	**	**	**
4	0.000	**	**	**	**	**
5	0.001	-3.687	-0.461	-4.148	98.933	1.067

Power Run

Team 11

TeamNumber	11
TeamName	Clarkson
Model	skidoo
Engine	ACE600

Displacement cc	600.00
RatedSpeed	7039
RatedTorque	37.0

