



Team Results for Clean Snowmobile Challenge 2017 Team 3



2017 Clean Snowmobile Competition - Lab Emission Event Emission Data Sheet

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Test Date       : 2017/03/08 15:03:30
Team Name      : ETS
Team Number    : 3
Model         : Rotax
Engine        : Rotax
Displacement[cc] : 600.00
100% Speed    : 6924
100% Torque   : 79.5
No of Strokes : 4
Fuel          : Gasoline           H/C: 2.38       O/C: 0.24
  
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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	:	39.3	26.5	14.4	7.1	0.0	16.0
HC_m g/hr	:	27.64	10.76	2.23	0.66	3.92	2.02
CO_m g/hr	:	5137.92	2230.41	1.87	69.23	176.87	784.64
NOx_m g/hr	:	42.73	43.12	245.51	0.21	0.20	84.64
Soot_m mg/hr	:	0.00	17.75	0.00	0.00	0.03	6.82
N2O_m mg/hr	:	0.15	0.15	0.07	0.00	0.01	0.07
CO2_m g/hr	:	54716.00	28394.67	17582.93	10784.49	3084.16	22737.69
CH4_m g/hr	:	8.80	6.64	1.43	0.46	2.83	3.28
W_HC g/hr	:	3.32	2.90	0.56	0.20	0.20	2.02
W_CO g/hr	:	616.55	602.21	0.47	21.46	8.84	784.64
W_NOx g/hr	:	5.13	11.64	61.38	0.06	0.01	84.64
W_HCNOx g/hr	:	8.44	14.55	61.93	0.27	0.21	86.66
W_Soot mg/hr	:	0.00	4.79	0.00	0.00	0.00	6.82
W_N2O g/hr	:	0.02	0.04	0.02	0.00	0.00	0.07
W_CO2 g/hr	:	6565.92	7666.56	4395.73	3343.19	154.21	22737.69
W_CH4 g/hr	:	1.06	1.79	0.36	0.14	0.14	3.28

Total Weighted Power [kW] 17.665

Weighted Emissions

	HC	CO	NOx	HC+NOx
Total Mass [g/hr]	7.18	1249.53	78.22	85.40
Specific Mass [g/kW-hr]	0.41	70.74	4.43	4.83
BSFC [g/kW-hr]	425.5			

Total Soot [mg/hr] 4.79 Specific Soot [mg/kW-hr] 0.27

Not Used for Competition

Total N2O [mg/hr]	0.08	Specific N2O [mg/kW-hr]	0.00
Total CO2 [g/hr]	22125.61	Specific CO2 [g/kW-hr]	1252.54
Total CH4 [g/hr]	3.49	Specific CH4 [g/kW-hr]	0.20
RMC BSFC [g/kW-hr]	490.85		

EMISSION TESTS:

	Value	Limit	Result
Power	57.62	<96.94 kW	PASS
Soot	0.27	<50 mg/kW-hr	PASS
CO	70.74	<275 g/kW-hr	PASS
HC + NOX	4.83	<90 g/kW-hr	PASS
E-Score	189.09	>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	6929.82	6061.92	5202.48	4502.47	1862.24	5173.32
Torque	Nm	54.15	41.78	26.35	15.04	0.00	29.52
Power	kW	39.30	26.52	14.36	7.09	0.00	15.99
BSFC	g/kw-hr	523.88	394.17	401.26	503.03	**	490.85
Fuel	g/hr	20586.37	10455.38	5760.30	3567.40	1104.75	7850.61
T_int	degC	6.80	11.24	15.10	9.37	13.07	11.30
RelHumid	%	26.98	29.52	27.32	29.63	25.82	28.50
Baro	in Hg	28.57	28.59	28.59	28.58	28.60	28.58
Baro	mmHg	725.65	726.08	726.23	725.94	726.47	725.98
Pvap_kPa	kPa	0.25	0.36	0.41	0.32	0.35	0.35
Pvap_inHg	inHg	0.07	0.11	0.12	0.09	0.10	0.10
AbsHumidity	grains/lb	11.32	16.12	18.64	14.50	15.67	15.62
SatPres	kPa	96.49	96.45	96.41	96.46	96.51	96.44
Hum Factor		0.77	0.78	0.79	0.78	0.78	0.78
F_fac		0.98	0.99	1.00	0.99	1.00	0.99
K_fac		1.01	1.02	1.02	1.01	1.02	1.02
Humidity	g/kg	1.62	2.30	2.66	2.07	2.24	2.23
H2		0.58	0.61	0.00	0.05	0.45	0.26
WetDry Factor		0.87	0.84	0.84	0.84	0.85	1.00



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Modal Emissions Concentrations

ModeNum		1	2	3	4	5	RMC
THC	ppmC1	139.98	134.13	49.27	24.13	462.47	31.68
CO	%	1.34	1.43	0.00	0.13	1.07	0.63
N2O	ppm	2.55	5.92	5.17	0.49	2.31	3.47
CH4	ppm	40.14	74.57	28.40	15.11	300.52	46.23
CO2	%	9.07	11.59	12.74	12.89	11.91	11.66
O2	%	3.83	0.20	0.35	0.00	0.67	1.31
CNOx	ppm	67.77	168.38	1701.33	2.37	7.22	415.20
AHC	ppm	5.39	2.92	1.60	1.46	6.23	2.69
C2H2	ppm	12.56	1.47	0.93	1.12	0.94	2.07
C2H4	ppm	11.06	2.87	3.38	0.37	3.84	4.19
C3H6	ppm	1.10	0.03	1.01	0.28	0.92	0.64
C4H6	ppm	1.64	21.90	0.92	7.78	1.49	7.90
ETOH	ppm	1.93	1.65	0.20	0.99	2.12	2.01
H2O	%	12.99	16.44	16.16	16.39	15.45	0.00
HCHO	ppm	0.90	0.42	0.74	0.25	0.67	0.79
HCN	ppm	0.75	9.18	0.13	0.21	0.24	2.04
HNCO	ppm	2.55	10.73	1.78	3.73	1.82	4.56
MECHO	ppm	1.21	1.09	0.58	0.55	1.54	1.26
NC5	ppm	4.03	2.52	1.72	1.59	6.67	2.51
NH3	ppm	22.14	602.91	1.90	199.95	29.72	209.40
NO	ppm	88.69	216.97	2154.77	4.17	9.62	532.46
NO2	ppm	0.40	0.17	1.74	0.40	0.37	0.48
Soot	mg/m3	0.00	0.13	0.00	0.00	0.00	0.06
AFR	:1	13.25	10.70	11.42	11.12	11.02	11.73



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Measurement Accuracy (SAE paper 961804)

ModeNum	H2_XLS %	ModalHC_Dry %	ModalFTIR_H2O %	N2 %	Ar %	AFR :1	Tr_Eff -
1	0.667	0.016	12.992	82.218	0.950	17.926	0.807
2	0.733	0.016	16.439	86.306	0.998	14.689	0.990
3	0.001	0.006	16.162	88.614	1.024	15.605	0.982
4	0.062	0.003	16.394	88.148	1.019	15.201	1.000
5	0.533	0.055	15.446	86.437	0.999	15.169	0.966

ModeNum	ModalWHC %	ModalC1 %	ModalC8 %	ModalSUM_HC %	ModalT_Emiss %	ModalError %
1	27.644	-2.292	-0.287	-2.579	97.637	2.363
2	10.758	-0.144	-0.018	-0.162	103.725	3.725
3	2.227	-0.264	-0.033	-0.297	105.212	5.212
4	0.661	0.003	0.000	0.003	104.809	4.809
5	3.921	-0.469	-0.059	-0.527	103.589	3.589

Power Run

Team 3

TeamNumber	3
TeamName	ETS
Model	Rotax
Engine	Rotax

Displacement cc	600.00
RatedSpeed	6924
RatedTorque	79.5

