



# Team Results for Clean Snowmobile Challenge 2014 Team 3 ECO



## 2014 Clean Snowmobile Competition - Lab Emission Event Emission Data Sheet

Test Date : 2014/03/06 17:11:48  
Team Name : Idaho  
Team Number : 3  
Model : Ski-Doo MXZTNT  
Engine : Rotax  
Displacement[cc] : 797.00  
100% Speed : 5855  
100% Torque : 75.2  
No of Strokes : 2  
Fuel : gasoline H/C: 1.99 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	:	45.7	20.4	11.4	5.7	0.0	13.6
HC_m g/hr	:	11.55	8.89	70.35	41.93	32.09	15.76
CO_m g/hr	:	94.58	197.26	18.57	26.86	16.73	92.86
NOx_m g/hr	:	412.37	109.60	25.15	4.74	5.64	59.82
Soot_m mg/hr	:	26.00	2571.97	39.14	11.86	834.61	725.66
N2O_m mg/hr	:	0.03	0.03	0.01	0.01	0.02	0.02
CO2_m g/hr	:	52291.34	20350.92	13884.34	14004.76	12857.76	20009.22
CH4_m g/hr	:	0.00	4.05	2.23	10.54	3.66	8.23
W_HC g/hr	:	1.39	2.40	17.59	13.00	1.60	15.76
W_CO g/hr	:	11.35	53.26	4.64	8.33	0.84	92.86
W_NOx g/hr	:	49.48	29.59	6.29	1.47	0.28	59.82
W_HCN0x g/hr	:	50.87	31.99	23.87	14.47	1.89	75.58
W_Soot mg/hr	:	3.12	694.43	9.78	3.68	41.73	725.66
W_N2O g/hr	:	0.00	0.01	0.00	0.00	0.00	0.02
W_CO2 g/hr	:	6274.96	5494.75	3471.09	4341.47	642.89	20009.22
W_CH4 g/hr	:	0.00	1.09	0.56	3.27	0.18	8.23

Total Weighted Power [kW] 15.606

### Weighted Emissions

	HC	CO	NOx	HC+NOx
Total Mass [g/hr]	35.98	78.41	87.12	123.09
Specific Mass [g/kW-hr]	2.31	5.02	5.58	7.89
BSFC [g/kW-hr]	475.5			

Total Soot [mg/hr] 752.75 Specific Soot [mg/kW-hr] 48.24

### Not Used for Competition

Total N2O [mg/hr]	0.02	Specific N2O [mg/kW-hr]	0.00
Total CO2 [g/hr]	20225.16	Specific CO2 [g/kW-hr]	1296.01
Total CH4 [g/hr]	5.10	Specific CH4 [g/kW-hr]	0.33
RMC BSFC [g/kW-hr]	474.55		

### EMISSION TESTS:

	Value	Limit	Result
Power	46.12	<96.94 kW	PASS
Soot	48.24	<100 mg/kW-hr	PASS
CO	5.02	<275 g/kW-hr	PASS
HC + NOX	7.89	<90 g/kW-hr	PASS
E-Score	203.49	>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	12031
PtsInMode	points	1210	3050	2720	3470	1480	12031
Speed	rpm	5853.50	4975.42	4391.66	3805.54	1201.08	4355.35
Torque	Nm	74.49	39.14	24.83	14.29	0.00	29.73
Power	kW	45.66	20.40	11.42	5.69	0.00	13.56
BSFC	g/kw-hr	365.99	323.03	394.17	792.96	**	474.55
Fuel	g/hr	16710.95	6588.30	4501.08	4515.16	4134.99	6434.12
T_int	degC	20.53	25.07	15.15	14.45	15.52	18.24
RelHumid	%	17.50	15.06	14.27	15.07	14.62	15.67
Baro	in Hg	28.73	28.73	28.72	28.73	28.72	28.73
Baro	mmHg	729.67	729.62	729.54	729.65	729.50	729.62
Pvap_kPa	kPa	0.36	0.39	0.22	0.22	0.23	0.28
Pvap_inHg	inHg	0.11	0.12	0.06	0.06	0.07	0.08
AbsHumidity	grains/lb	16.08	17.67	9.70	9.85	10.15	12.68
SatPres	kPa	96.92	96.88	97.05	97.06	97.03	96.99
Hum Factor		1.00	1.00	1.00	1.00	1.00	1.00
F_fac		1.01	1.02	1.00	0.99	1.00	1.00
K_fac		1.03	1.04	1.02	1.02	1.02	1.02
Humidity	g/kg	2.30	2.52	1.39	1.41	1.45	1.81
H2		0.01	0.06	0.01	0.01	0.00	0.03
WetDry Factor		0.88	0.89	0.90	0.89	0.95	1.00



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## Modal Emissions Concentrations

ModeNum		1	2	3	4	5	RMC
THC	ppmC1	89.30	151.61	1638.37	1094.41	432.18	270.65
CO	%	0.04	0.17	0.02	0.04	0.01	0.08
N2O	ppm	0.77	1.48	1.02	0.63	0.79	0.91
CH4	ppm	0.00	60.41	45.55	240.88	43.12	123.89
CO2	%	12.88	11.05	10.30	11.64	5.51	10.94
O2	%	0.39	3.23	4.66	2.41	12.17	3.88
CNOx	ppm	971.46	569.23	178.46	37.69	23.15	313.04
AHC	ppm	0.00	0.00	56.91	18.47	10.94	19.89
C2H2	ppm	2.16	5.16	2.63	2.97	1.58	4.82
C2H4	ppm	0.17	23.05	46.91	68.41	7.80	48.91
C3H6	ppm	0.07	0.12	21.47	16.96	5.06	13.44
C4H6	ppm	0.05	0.07	0.61	0.39	0.08	0.67
ETOH	ppm	0.54	2.28	0.00	0.00	0.73	0.68
H2O	%	12.45	10.90	9.80	11.21	5.35	0.00
HCHO	ppm	2.77	11.66	42.62	31.10	17.37	32.74
HCN	ppm	1.62	2.65	1.11	1.04	0.47	1.55
HNCO	ppm	5.79	3.33	2.17	1.20	1.56	3.22
MECHO	ppm	0.02	0.46	13.68	4.86	7.52	6.02
NC5	ppm	32.97	10.04	110.00	52.34	27.56	44.84
NH3	ppm	5.54	0.28	0.05	0.12	0.00	0.97
NO	ppm	970.59	548.17	155.03	31.79	2.58	295.29
NO2	ppm	0.88	21.14	23.43	5.91	20.57	17.75
Soot	mg/m3	0.12	25.41	0.53	0.18	6.53	7.09
AFR	:1	14.35	16.68	17.52	15.58	34.20	17.26



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Measurement Accuracy (SAE paper 961804)

ModeNum	H2_XLS %	ModalHC_Dry %	ModalFTIR_H2O %	N2 %	Ar %	AFR :1	Tr_Eff -
1	0.014	0.010	12.449	79.792	0.922	15.037	0.980
2	0.063	0.017	10.900	80.359	0.929	17.475	0.837
3	0.008	0.182	9.803	79.992	0.925	18.871	0.767
4	0.013	0.123	11.212	79.805	0.922	16.592	0.878
5	0.004	0.046	5.353	79.485	0.919	36.116	0.404

ModeNum	ModalWHC %	ModalC1 %	ModalC8 %	ModalSUM_HC %	ModalT_Emiss %	ModalError %
1	11.548	-0.279	-0.035	-0.314	95.716	4.284
2	8.893	-2.033	-0.254	-2.287	95.342	4.658
3	70.345	-2.532	-0.317	-2.849	94.699	5.301
4	41.928	-1.491	-0.186	-1.678	94.931	5.069
5	32.092	-3.458	-0.432	-3.890	95.215	4.785

# Power Run

## Team 3 ECO

TeamNumber	3
TeamName	Idaho
Model	Ski-Doo MXZTNT
Engine	Rotax

Displacement cc	797.00
RatedSpeed	5855
RatedTorque	75.2

