



# Team Results for Clean Snowmobile Challenge 2017 Team 7



## 2017 Clean Snowmobile Competition - Lab Emission Event Emission Data Sheet

Test Date : 2017/03/08 13:51:50  
Team Name : Idaho  
Team Number : 7  
Model : Skidoo  
Engine : Rotax  
Displacement[cc] : 600.00  
100% Speed : 6792  
100% Torque : 94.5  
No of Strokes : 2  
Fuel : Gasoline H/C: 2.38 O/C: 0.24

ModeNum	:	1	2	3	4	5	RMC
Weighting	:	0.12	0.27	0.25	0.31	0.05	1.00
Power kW	:	68.6	29.1	17.3	8.3	0.0	20.3
HC_m g/hr	:	2669.61	1.22	334.61	192.17	94.29	125.23
CO_m g/hr	:	29494.17	321.27	323.25	73.59	24.55	1766.26
NOx_m g/hr	:	48.58	163.45	38.95	4.93	0.54	62.16
Soot_m mg/hr	:	554.29	277.55	206.36	112.67	36.23	281.91
N2O_m mg/hr	:	1.24	0.14	0.03	0.01	0.00	0.10
CO2_m g/hr	:	49600.40	34988.08	20001.32	12454.57	1999.72	27955.61
CH4_m g/hr	:	544.97	0.12	8.46	4.96	3.76	32.35
W_HC g/hr	:	320.35	0.33	83.65	59.57	4.71	125.23
W_CO g/hr	:	3539.30	86.74	80.81	22.81	1.23	1766.26
W_NOx g/hr	:	5.83	44.13	9.74	1.53	0.03	62.16
W_HCNOx g/hr	:	326.18	44.46	93.39	61.10	4.74	187.39
W_Soot mg/hr	:	66.51	74.94	51.59	34.93	1.81	281.91
W_N2O g/hr	:	0.15	0.04	0.01	0.00	0.00	0.10
W_CO2 g/hr	:	5952.05	9446.78	5000.33	3860.92	99.99	27955.61
W_CH4 g/hr	:	65.40	0.03	2.11	1.54	0.19	32.35

Total Weighted Power [kW] 23.010

### Weighted Emissions

	HC	CO	NOx	HC+NOx
Total Mass [g/hr]	468.63	3730.90	61.25	529.88
Specific Mass [g/kW-hr]	20.37	162.14	2.66	23.03
BSFC [g/kW-hr]	429.3			

Total Soot [mg/hr] 229.78 Specific Soot [mg/kW-hr] 9.99

### Not Used for Competition

Total N2O [mg/hr]	0.20	Specific N2O [mg/kW-hr]	0.01
Total CO2 [g/hr]	24360.06	Specific CO2 [g/kW-hr]	1058.67
Total CH4 [g/hr]	69.27	Specific CH4 [g/kW-hr]	3.01
RMC BSFC [g/kW-hr]	501.60		

### EMISSION TESTS:

	Value	Limit	Result
Power	67.25	<96.94 kW	PASS
Soot	9.99	<50 mg/kW-hr	PASS
CO	162.14	<275 g/kW-hr	PASS
HC + NOX	23.03	<90 g/kW-hr	PASS
E-Score	154.11	>175	FAIL
Valid Data for All 5 Modes			PASS
RMC			PASS
LAB EMISSION TEST			FAIL



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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	6791.95	5773.55	5297.75	4414.78	1206.30	5102.34
Torque	Nm	96.39	48.19	31.24	18.02	0.00	38.01
Power	kW	68.55	29.14	17.33	8.33	0.00	20.31
BSFC	g/kw-hr	497.18	398.88	406.74	516.99	**	501.60
Fuel	g/hr	34083.69	11622.53	7049.87	4307.99	761.68	10187.31
T_int	degC	10.47	11.59	13.51	11.76	13.99	12.19
RelHumid	%	35.13	31.68	27.61	32.29	24.43	31.25
Baro	in Hg	28.52	28.54	28.54	28.53	28.53	28.53
Baro	mmHg	724.49	724.79	724.85	724.72	724.72	724.69
Pvap_kPa	kPa	0.41	0.39	0.38	0.40	0.35	0.40
Pvap_inHg	inHg	0.12	0.12	0.11	0.12	0.10	0.12
AbsHumidity	grains/lb	18.39	17.70	17.22	18.22	15.67	18.08
SatPres	kPa	96.18	96.24	96.26	96.22	96.27	96.22
Hum Factor		1.00	1.00	1.00	1.00	1.00	1.00
F_fac		0.99	1.00	1.00	1.00	1.00	1.00
K_fac		1.02	1.02	1.02	1.02	1.02	1.02
Humidity	g/kg	2.63	2.53	2.46	2.60	2.24	2.58
H2		3.76	0.06	0.09	0.04	0.04	0.39
WetDry Factor		0.83	0.86	0.89	0.87	0.94	1.00



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## Modal Emissions Concentrations

ModeNum		1	2	3	4	5	RMC
THC	ppmC1	11296.61	11.99	4339.23	4599.53	6832.97	1258.96
CO	%	6.42	0.16	0.22	0.09	0.09	0.91
N2O	ppm	17.13	4.59	1.08	0.82	0.91	3.40
CH4	ppm	2076.91	1.03	98.75	106.82	245.25	292.89
CO2	%	6.87	11.21	8.49	9.76	4.74	9.20
O2	%	0.46	2.43	6.63	4.76	12.70	5.08
CNOx	ppm	64.39	501.13	158.20	36.96	12.23	195.74
AHC	ppm	109.87	1.55	0.00	35.89	40.93	20.22
C2H2	ppm	133.32	1.08	3.70	1.75	3.11	17.79
C2H4	ppm	1698.70	0.56	198.23	142.15	157.62	320.86
C3H6	ppm	187.55	0.74	26.06	14.05	8.16	47.82
C4H6	ppm	45.95	1.00	0.09	0.15	0.36	6.09
ETOH	ppm	279.03	0.50	641.46	446.23	832.88	322.81
H2O	%	17.27	14.39	11.09	12.51	6.34	0.03
HCHO	ppm	217.95	0.39	232.68	160.16	161.23	166.11
HCN	ppm	3.77	2.72	0.84	0.37	0.19	1.98
HNCO	ppm	6.15	4.49	6.35	2.71	1.46	5.19
MECHO	ppm	344.35	0.77	557.26	527.98	775.51	298.59
NC5	ppm	26.85	3.46	202.52	300.09	420.03	128.54
NH3	ppm	32.27	0.53	0.00	0.00	0.00	3.51
NO	ppm	63.10	479.22	104.86	24.14	2.95	159.71
NO2	ppm	1.63	21.84	53.30	12.81	9.31	36.20
Soot	mg/m3	1.61	1.57	1.57	1.57	1.57	1.64
AFR	:1	6.76	12.73	14.52	12.86	21.48	13.97



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Measurement Accuracy (SAE paper 961804)

ModeNum	H2_XLS %	ModalHC_Dry %	ModalFTIR_H2O %	N2 %	Ar %	AFR :1	Tr_Eff -
1	4.541	1.365	17.266	79.534	0.919	11.143	0.976
2	0.076	0.001	14.386	86.483	1.000	17.237	0.878
3	0.098	0.488	11.091	84.377	0.975	21.339	0.670
4	0.041	0.526	12.512	85.220	0.985	18.953	0.761
5	0.039	0.730	6.337	81.256	0.939	35.297	0.378

ModeNum	ModalWHC %	ModalC1 %	ModalC8 %	ModalSUM_HC %	ModalT_Emiss %	ModalError %
1	2669.610	0.949	0.119	1.068	102.693	2.693
2	1.225	-1.623	-0.203	-1.826	101.911	1.911
3	334.612	-2.909	-0.364	-3.273	99.444	0.556
4	192.174	-2.287	-0.286	-2.573	100.379	0.379
5	94.292	-2.935	-0.367	-3.302	97.657	2.343

# Power Run

Team 7

TeamNumber	7
TeamName	Idaho
Model	Skidoo
Engine	Rotax

Displacement cc	600.00
RatedSpeed	6792
RatedTorque	94.5

