



Team Results for Clean Snowmobile Challenge 2014 Team 12



2014 Clean Snowmobile Competition - Lab Emission Event Emission Data Sheet

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Test Date       : 2014/03/05 11:35:18
Team Name      : UMD
Team Number    : 12
Model         : AZ7000LXR
Engine        : Yamaha
Displacement[cc] : 1049.00
100% Speed    : 8635
100% Torque   : 93.0
No of Strokes : 4
Fuel          : gasoline           H/C: 1.99       O/C: 0.03
  
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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	:	84.4	36.5	21.7	10.4	0.0	24.6
HC_m g/hr	:	186.62	6.01	8.68	18.54	6.15	9.20
CO_m g/hr	:	10743.64	587.08	737.07	718.73	691.45	1377.19
NOx_m g/hr	:	76.73	1.70	0.19	0.01	1.14	4.76
Soot_m mg/hr	:	50.15	41.55	30.93	224.89	0.36	145.80
N2O_m mg/hr	:	0.00	0.00	0.00	0.00	0.00	0.00
CO2_m g/hr	:	61576.61	36923.82	26088.18	18296.85	13261.87	30541.36
CH4_m g/hr	:	34.48	4.81	6.14	11.39	3.62	12.20
W_HC g/hr	:	22.39	1.62	2.17	5.75	0.31	9.20
W_CO g/hr	:	1289.24	158.51	184.27	222.81	34.57	1377.19
W_NOx g/hr	:	9.21	0.46	0.05	0.00	0.06	4.76
W_HCNOx g/hr	:	31.60	2.08	2.22	5.75	0.36	13.96
W_Soot mg/hr	:	6.02	11.22	7.73	69.72	0.02	145.80
W_N2O g/hr	:	0.00	0.00	0.00	0.00	0.00	0.00
W_CO2 g/hr	:	7389.19	9969.43	6522.04	5672.02	663.09	30541.36
W_CH4 g/hr	:	4.14	1.30	1.53	3.53	0.18	12.20

Total Weighted Power [kW] 28.599

Weighted Emissions

	HC	CO	NOx	HC+NOx
Total Mass [g/hr]	32.24	1889.39	9.77	42.02
Specific Mass [g/kW-hr]	1.13	66.06	0.34	1.47
BSFC [g/kW-hr]	411.0			

Total Soot [mg/hr] 94.70 Specific Soot [mg/kW-hr] 3.31

Not Used for Competition

Total N2O [mg/hr]	0.00	Specific N2O [mg/kW-hr]	0.00
Total CO2 [g/hr]	30215.79	Specific CO2 [g/kW-hr]	1056.53
Total CH4 [g/hr]	10.68	Specific CH4 [g/kW-hr]	0.37
RMC BSFC [g/kW-hr]	423.63		

EMISSION TESTS:

	Value	Limit	Result
Power	84.09	<96.94 kW	PASS
Soot	3.31	<100 mg/kW-hr	PASS
CO	66.06	<275 g/kW-hr	PASS
HC + NOX	1.47	<90 g/kW-hr	PASS
E-Score	192.50	>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	12032
PtsInMode	points	1210	3050	2720	3470	1480	12032
Speed	rpm	8635.22	7340.54	6476.34	5613.54	1557.48	6379.17
Torque	Nm	93.35	47.43	31.94	17.62	0.00	36.83
Power	kW	84.41	36.46	21.66	10.36	0.00	24.61
BSFC	g/kw-hr	298.20	330.74	400.92	599.13	**	423.63
Fuel	g/hr	25171.20	12058.08	8685.21	6204.76	4575.34	10424.11
T_int	degC	20.49	4.41	14.38	17.43	11.07	13.37
RelHumid	%	18.23	27.21	23.81	23.36	23.61	22.51
Baro	in Hg	29.36	29.37	29.37	29.36	29.37	29.37
Baro	mmHg	745.75	745.94	745.97	745.84	745.98	745.88
Pvap_kPa	kPa	0.37	0.22	0.34	0.40	0.28	0.31
Pvap_inHg	inHg	0.11	0.06	0.10	0.12	0.08	0.09
AbsHumidity	grains/lb	16.35	9.60	15.17	17.69	12.42	13.53
SatPres	kPa	99.05	99.23	99.11	99.03	99.17	99.13
Hum Factor		0.78	0.76	0.78	0.79	0.77	0.78
F_fac		0.99	0.95	0.97	0.98	0.97	0.97
K_fac		1.01	0.98	0.99	1.00	0.99	0.99
Humidity	g/kg	2.34	1.37	2.17	2.53	1.77	1.93
H2		1.19	0.11	0.20	0.28	0.36	0.31
WetDry Factor		0.87	0.87	0.87	0.88	0.88	1.00



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Modal Emissions Concentrations

ModeNum		1	2	3	4	5	RMC
THC	ppmC1	1067.29	67.71	136.38	411.61	184.65	121.17
CO	%	3.07	0.33	0.58	0.80	1.04	0.91
N2O	ppm	0.00	0.05	0.00	0.00	0.01	0.06
CH4	ppm	172.75	47.46	84.52	221.45	95.23	140.85
CO2	%	11.21	13.25	13.06	12.93	12.68	12.82
O2	%	0.00	0.00	0.00	0.00	0.00	-0.02
CNOx	ppm	133.68	5.83	0.92	0.08	10.42	19.12
AHC	ppm	51.43	0.00	0.48	6.22	3.10	10.69
C2H2	ppm	6.02	2.20	2.20	2.70	5.55	2.74
C2H4	ppm	73.00	1.74	5.29	19.16	9.59	17.45
C3H6	ppm	25.21	0.02	0.37	1.91	0.02	3.96
C4H6	ppm	31.92	0.74	3.38	3.59	2.57	6.01
ETOH	ppm	15.73	3.50	5.75	6.43	3.99	6.18
H2O	%	12.72	12.68	12.58	12.48	12.32	0.00
HCHO	ppm	1.51	0.48	0.34	0.55	0.84	1.13
HCN	ppm	11.97	1.19	1.23	1.06	3.41	2.60
HNCO	ppm	19.91	0.79	0.56	0.44	1.17	3.13
MECHO	ppm	1.39	0.05	0.03	0.11	0.06	0.31
NC5	ppm	13.83	0.33	0.20	0.18	0.00	3.17
NH3	ppm	1045.77	18.12	84.67	113.59	31.28	178.38
NO	ppm	169.50	8.01	1.49	0.23	13.79	24.61
NO2	ppm	0.68	0.00	0.00	0.00	0.00	0.28
Soot	mg/m3	0.17	0.27	0.28	2.84	0.01	1.10
AFR	:1	12.46	13.91	13.78	13.60	13.56	13.62



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Measurement Accuracy (SAE paper 961804)

ModeNum	H2_XLS %	ModalHC_Dry %	ModalFTIR_H2O %	N2 %	Ar %	AFR :1	Tr_Eff -
1	1.362	0.122	12.715	78.034	0.902	13.227	1.000
2	0.128	0.008	12.677	80.735	0.933	14.572	1.000
3	0.226	0.016	12.582	80.199	0.927	14.449	1.000
4	0.314	0.047	12.485	79.891	0.923	14.320	1.000
5	0.413	0.021	12.319	78.918	0.912	14.231	1.000

ModeNum	ModalWHC %	ModalC1 %	ModalC8 %	ModalSUM_HC %	ModalT_Emiss %	ModalError %
1	186.617	0.122	0.015	0.138	96.826	3.174
2	6.008	0.008	0.001	0.009	97.359	2.641
3	8.677	0.016	0.002	0.018	96.969	3.031
4	18.544	0.047	0.006	0.053	96.872	3.128
5	6.150	0.021	0.003	0.024	95.915	4.085

Power Run

Team 12

TeamNumber	12
TeamName	UMD
Model	AZ7000LXR
Engine	Yamaha

Displacement cc	1049.00
RatedSpeed	8635
RatedTorque	93.0

