



Team Results for Clean Snowmobile Challenge 2014 Team 14



2014 Clean Snowmobile Competition - Lab Emission Event Emission Data Sheet

Test Date : 2014/03/06 15:25:47
Team Name : Kettering
Team Number : 14
Model : MZR sport 600ACE
Engine : Rotax
Displacement[cc] : 600.00
100% Speed : 6871
100% Torque : 66.3
No of Strokes : 4
Fuel : gasoline H/C: 1.99 O/C: 0.03

ModeNum	:	1	2	3	4	5
Weighting	:	0.12	0.27	0.25	0.31	0.05
Power kW	:	36.0	20.6	12.5	5.9	0.0
HC_m g/hr	:	3.31	51.87	2.13	3.08	13.17
CO_m g/hr	:	20.38	2546.89	17.48	0.38	22.64
NOx_m g/hr	:	463.62	3.78	78.27	35.80	3.38
Soot_m mg/hr	:	35.77	19.69	17.49	11.91	9.04
N2O_m mg/hr	:	0.07	0.02	0.03	0.02	0.11
CO2_m g/hr	:	33232.92	18376.61	14619.77	12523.91	11079.53
CH4_m g/hr	:	0.49	6.32	1.01	0.86	0.94
W_HC g/hr	:	0.40	14.01	0.53	0.96	0.66
W_CO g/hr	:	2.45	687.66	4.37	0.12	1.13
W_NOx g/hr	:	55.63	1.02	19.57	11.10	0.17
W_HCN0x g/hr	:	56.03	15.03	20.10	12.05	0.83
W_Soot mg/hr	:	4.29	5.32	4.37	3.69	0.45
W_N2O g/hr	:	0.01	0.00	0.01	0.00	0.01
W_CO2 g/hr	:	3987.95	4961.69	3654.94	3882.41	553.98
W_CH4 g/hr	:	0.06	1.71	0.25	0.27	0.05

Total Weighted Power [kW] 14.846

Weighted Emissions

	HC	CO	NOx	HC+NOx
Total Mass [g/hr]	16.55	695.72	87.49	104.04
Specific Mass [g/kW-hr]	1.11	46.86	5.89	7.01
BSFC [g/kW-hr]	431.9			

Total Soot [mg/hr] 18.12 Specific Soot [mg/kW-hr] 1.22

Not Used for Competition

Total N2O [mg/hr]	0.03	Specific N2O [mg/kW-hr]	0.00
Total CO2 [g/hr]	17040.97	Specific CO2 [g/kW-hr]	1147.81
Total CH4 [g/hr]	2.33	Specific CH4 [g/kW-hr]	0.16
RMC BSFC [g/kW-hr]			

EMISSION TESTS:

	Value	Limit	Result
Power	47.68	<96.94 kW	PASS
Soot	1.22	<100 mg/kW-hr	PASS
CO	46.86	<275 g/kW-hr	PASS
HC + NOX	7.01	<90 g/kW-hr	PASS
E-Score	193.61	>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
Total Points	points	600	237	430	1200	1200
PtsInMode	points	1210	400	700	3470	1800
Speed	rpm	6844.16	5836.54	5154.34	4467.72	1669.28
Torque	Nm	50.25	33.72	23.17	12.64	0.00
Power	kW	36.02	20.61	12.50	5.91	0.00
BSFC	g/kw-hr	294.20	348.27	373.18	674.94	**
Fuel	g/hr	10596.47	7178.22	4666.51	3991.49	3552.76
T_int	degC	9.09	16.35	11.39	7.56	13.81
RelHumid	%	17.29	16.90	16.35	18.82	16.94
Baro	in Hg	28.77	28.77	28.77	28.78	28.77
Baro	mmHg	730.87	730.75	730.69	731.12	730.81
Pvap_kPa	kPa	0.18	0.27	0.20	0.18	0.24
Pvap_inHg	inHg	0.05	0.08	0.06	0.05	0.07
AbsHumidity	grains/lb	8.25	12.28	8.94	8.20	10.65
SatPres	kPa	97.26	97.15	97.22	97.29	97.19
Hum Factor		0.76	0.77	0.76	0.76	0.77
F_fac		0.98	1.00	0.99	0.98	0.99
K_fac		1.01	1.02	1.01	1.00	1.01
Humidity	g/kg	1.18	1.75	1.28	1.17	1.52
H2		0.00	0.98	0.01	0.00	0.01
WetDry Factor		0.89	0.88	0.88	0.89	0.88



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Modal Emissions Concentrations

ModeNum		1	2	3	4	5
THC	ppmC1	34.92	1055.74	56.34	86.04	467.97
CO	%	0.01	2.59	0.02	0.00	0.04
N2O	ppm	2.49	1.17	2.76	1.41	12.71
CH4	ppm	4.55	112.61	23.43	20.90	29.12
CO2	%	11.17	11.91	12.32	11.13	12.53
O2	%	3.42	0.00	1.74	3.50	1.13
CNOx	ppm	1490.62	23.42	631.19	304.38	36.55
AHC	ppm	0.00	68.64	0.28	0.30	19.65
C2H2	ppm	3.02	3.58	1.97	1.82	5.79
C2H4	ppm	7.44	17.95	1.47	7.80	35.38
C3H6	ppm	0.16	13.82	0.06	0.03	6.13
C4H6	ppm	0.20	29.30	1.47	0.16	0.50
ETOH	ppm	2.02	9.90	3.07	2.27	2.62
H2O	%	10.72	11.52	11.64	10.63	11.87
HCHO	ppm	2.83	1.19	0.37	0.91	2.15
HCN	ppm	0.98	9.66	1.02	0.74	1.05
HNCO	ppm	1.13	17.04	1.35	0.32	0.12
MECHO	ppm	0.10	2.11	0.00	0.10	0.39
NC5	ppm	0.09	40.37	1.52	2.66	17.37
NH3	ppm	0.10	1125.72	32.14	0.36	0.60
NO	ppm	1925.63	30.09	789.22	372.40	48.03
NO2	ppm	32.64	0.25	37.95	26.97	0.00
Soot	mg/m3	0.22	0.23	0.26	0.19	0.18
AFR	:1	17.02	12.69	15.40	17.04	14.74



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Measurement Accuracy (SAE paper 961804)

ModeNum	H2_XLS %	ModalHC_Dry %	ModalFTIR_H2O %	N2 %	Ar %	AFR :1	Tr_Eff -
1	0.004	0.004	10.718	81.134	0.938	17.815	0.828
2	1.103	0.119	11.517	76.952	0.889	13.470	1.000
3	0.009	0.006	11.644	81.072	0.937	16.131	0.912
4	0.000	0.010	10.628	80.763	0.934	17.834	0.824
5	0.015	0.053	11.875	79.853	0.923	15.541	0.943

ModeNum	ModalWHC %	ModalC1 %	ModalC8 %	ModalSUM_HC %	ModalT_Emiss %	ModalError %
1	3.309	-2.148	-0.268	-2.416	96.226	3.774
2	51.875	0.119	0.015	0.134	95.473	4.527
3	2.128	-1.220	-0.153	-1.373	96.677	3.323
4	3.083	-2.186	-0.273	-2.459	95.657	4.343
5	13.174	-0.766	-0.096	-0.862	95.483	4.517

Power Run

Team 14

TeamNumber	14
TeamName	Kettering
Model	MZR sport 600ACE
Engine	Rotax

Displacement cc	600.00
RatedSpeed	6871
RatedTorque	66.3

