



Team Results for Clean Snowmobile Challenge 2016 Team 3



2016 Clean Snowmobile Competition - Lab Emission Event Emission Data Sheet

Test Date : 2016/03/11 09:47:01
 Team Name : ETS
 Team Number : 3
 Model : BRP
 Engine : BRP
 Displacement[cc] : 600.00
 100% Speed : 7023
 100% Torque : 71.6
 No of Strokes : 4
 Fuel : GASOLINE H/C: 2.00 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	:	47.7	22.9	13.0	7.3	0.0	15.8
HC_m g/hr	:	82.23	1.22	1.49	0.85	1.01	2.03
CO_m g/hr	:	15667.10	210.34	0.96	0.81	114.51	854.08
NOx_m g/hr	:	10.01	73.01	163.58	34.25	0.02	102.80
Soot_m mg/hr	:	182.55	19.73	0.16	0.12	0.07	15.27
N2O_m mg/hr	:	0.49	0.03	0.07	0.02	0.00	0.06
CO2_m g/hr	:	32979.43	22784.54	13465.29	8844.05	2622.72	18100.45
CH4_m g/hr	:	38.40	0.42	0.80	0.45	0.51	2.66
W_HC g/hr	:	9.87	0.33	0.37	0.26	0.05	2.03
W_CO g/hr	:	1880.05	56.79	0.24	0.25	5.73	854.08
W_NOx g/hr	:	1.20	19.71	40.90	10.62	0.00	102.80
W_HCNOx g/hr	:	11.07	20.04	41.27	10.88	0.05	104.84
W_Soot mg/hr	:	21.91	5.33	0.04	0.04	0.00	15.27
W_N2O g/hr	:	0.06	0.01	0.02	0.00	0.00	0.06
W_CO2 g/hr	:	3957.53	6151.83	3366.32	2741.65	131.14	18100.45
W_CH4 g/hr	:	4.61	0.11	0.20	0.14	0.03	2.66

Total Weighted Power [kW] 17.424

Weighted Emissions

	HC	CO	NOx	HC+NOx
Total Mass [g/hr]	10.88	1943.06	72.43	83.31
Specific Mass [g/kW-hr]	0.62	111.52	4.16	4.78
BSFC [g/kW-hr]	335.9			

Total Soot [mg/hr] 27.32 Specific Soot [mg/kW-hr] 1.57

Not Used for Competition

Total N2O [mg/hr]	0.09	Specific N2O [mg/kW-hr]	0.01
Total CO2 [g/hr]	16348.47	Specific CO2 [g/kW-hr]	938.27
Total CH4 [g/hr]	5.09	Specific CH4 [g/kW-hr]	0.29
RMC BSFC [g/kW-hr]	392.01		

EMISSION TESTS:

	Value	Limit	Result
Power	52.62	<96.94 kW	PASS
Soot	1.57	<50 mg/kW-hr	PASS
CO	111.52	<275 g/kW-hr	PASS
HC + NOX	4.78	<90 g/kW-hr	PASS
E-Score	178.93	>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	7022.13	5974.10	5266.56	4564.40	1608.89	5250.38
Torque	Nm	64.85	36.66	23.64	15.18	0.00	28.76
Power	kW	47.69	22.93	13.04	7.26	0.00	15.81
BSFC	g/kw-hr	386.60	321.27	329.26	388.48	**	392.01
Fuel	g/hr	18436.74	7367.45	4293.05	2819.65	894.15	6197.88
T_int	degC	17.00	13.45	13.56	11.08	11.75	13.56
RelHumid	%	34.22	38.80	40.27	37.46	41.02	37.52
Baro	in Hg	29.12	29.12	29.10	29.12	29.12	29.12
Baro	mmHg	739.55	739.57	739.26	739.54	739.53	739.52
Pvap_kPa	kPa	0.57	0.53	0.56	0.45	0.51	0.52
Pvap_inHg	inHg	0.17	0.16	0.16	0.13	0.15	0.15
AbsHumidity	grains/lb	25.56	23.69	24.76	19.91	22.69	23.04
SatPres	kPa	98.02	98.07	98.00	98.15	98.08	98.08
Hum Factor		0.81	0.81	0.81	0.79	0.80	0.80
F_fac		0.99	0.98	0.98	0.98	0.98	0.98
K_fac		1.01	1.00	1.00	1.00	1.00	1.00
Humidity	g/kg	3.65	3.38	3.54	2.84	3.24	3.29
H2		2.94	0.06	0.00	0.00	0.15	0.29
WetDry Factor		0.87	0.86	0.87	0.89	0.92	1.00



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Modal Emissions Concentrations

ModeNum		1	2	3	4	5	RMC
THC	ppmC1	661.10	22.05	43.19	30.36	77.78	39.21
CO	%	6.31	0.19	0.00	0.00	0.44	0.83
N2O	ppm	12.65	1.86	6.55	1.79	1.08	3.81
CH4	ppm	270.63	6.70	20.34	14.19	34.26	44.99
CO2	%	8.45	13.14	12.48	10.12	6.44	11.14
O2	%	0.00	0.08	1.38	4.97	10.15	2.62
CNOx	ppm	24.53	402.93	1450.16	374.79	0.37	605.14
AHC	ppm	15.25	0.08	0.05	0.02	0.68	2.27
C2H2	ppm	5.37	1.23	0.91	0.78	0.76	1.60
C2H4	ppm	62.70	1.05	1.08	1.00	0.84	9.40
C3H6	ppm	5.71	0.32	0.45	0.17	0.36	1.09
C4H6	ppm	5.50	2.06	0.57	0.38	0.51	1.77
ETOH	ppm	2.32	1.06	1.45	2.83	3.43	2.68
H2O	%	13.25	13.77	13.29	11.15	7.80	0.00
HCHO	ppm	0.48	0.13	0.38	0.54	0.38	0.53
HCN	ppm	11.33	1.11	0.63	0.53	0.33	2.22
HNCO	ppm	2.05	2.15	1.44	0.92	0.98	1.68
MECHO	ppm	0.24	0.07	0.16	0.02	0.07	0.08
NC5	ppm	2.26	0.47	0.86	0.81	4.20	1.24
NH3	ppm	130.19	38.31	2.61	5.74	31.68	36.49
NO	ppm	29.02	504.37	1790.81	470.44	0.30	752.14
NO2	ppm	1.21	1.24	1.80	2.24	0.25	1.61
Soot	mg/m3	0.93	0.20	0.00	0.00	0.00	0.17
AFR	:1	11.13	14.07	15.18	18.76	27.61	15.76



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Measurement Accuracy (SAE paper 961804)

ModeNum	H2_XLS %	ModalHC_Dry %	ModalFTIR_H2O %	N2 %	Ar %	AFR :1	Tr_Eff -
1	3.386	0.076	13.253	74.417	0.860	11.731	1.000
2	0.074	0.003	13.773	83.206	0.962	14.735	0.996
3	0.001	0.005	13.287	84.546	0.977	15.898	0.930
4	0.001	0.003	11.148	84.015	0.971	19.600	0.751
5	0.167	0.008	7.795	82.300	0.951	28.809	0.500

ModeNum	ModalWHC %	ModalC1 %	ModalC8 %	ModalSUM_HC %	ModalT_Emiss %	ModalError %
1	82.225	0.076	0.010	0.086	95.764	4.236
2	1.218	-0.063	-0.008	-0.071	99.791	0.209
3	1.485	-0.999	-0.125	-1.124	100.588	0.588
4	0.846	-2.832	-0.354	-3.186	98.838	1.162
5	1.010	-3.726	-0.466	-4.192	97.691	2.309

Power Run

Team 3

TeamNumber	3
TeamName	ETS
Model	BRP
Engine	BRP

Displacement cc	600.00
RatedSpeed	7023
RatedTorque	71.6

