



Team Results for Clean Snowmobile Challenge 2011

2011 Clean Snowmobile Competition - Lab Emission Event Emission Data Sheet

Test Date :
Team Name : Univ of Alaska - Fairbank
Team Number : 13
Model : UA-F
Engine : UA-F
Displacement[cc] : 499cc
100% Speed : 10200
100% Torque : 47.0
No of Strokes : 4
Fuel : Gasoline H/C: 1.92 O/C: 0.10

ModeNum	:	1	2	3	4	5
Weighting	:	0.12	0.27	0.25	0.31	0.05
Power kW	:	48.3	19.6	12.5	6.1	0.0
HC_m g/hr	:	302.42	111.14	83.20	49.07	44.71
CO_m g/hr	:	16168.58	6838.05	4578.91	2020.28	811.53
NOx_m g/hr	:	16.83	0.83	0.12	0.03	0.00
Soot_m mg/hr	:	314.31	116.01	0.20	0.00	2.44
N2O_m mg/hr	:	0.04	0.01	0.01	0.00	0.00
CO2_m g/hr	:	54834.75	25777.21	17755.74	12304.72	3019.16
CH4_m g/hr	:	66.30	21.91	16.30	10.79	7.37
W_HC g/hr	:	36.29	30.01	20.80	15.21	2.24
W_CO g/hr	:	1940.23	1846.27	1144.73	626.29	40.58
W_NOx g/hr	:	2.02	0.22	0.03	0.01	0.00
W_HCNOx g/hr	:	38.31	30.23	20.83	15.22	2.24
W_Soot mg/hr	:	37.72	31.32	0.05	0.00	0.12
W_N2O g/hr	:	0.00	0.00	0.00	0.00	0.00
W_CO2 g/hr	:	6580.17	6959.85	4438.93	3814.46	150.96
W_CH4 g/hr	:	7.96	5.92	4.07	3.34	0.37

Total Weighted Power [kW] 16.094

Weighted Emissions

	HC	CO	NOx	HC+NOx
Total Mass [g/hr]	104.55	5598.09	2.28	106.83
Specific Mass [g/kW-hr]	6.50	347.85	0.14	6.64
BSFC [g/kW-hr]	637.2			

Total Soot [mg/hr] 69.21 Specific Soot [mg/kW-hr] 4.30

Not Used for Competition

Total N2O [mg/hr]	0.01	Specific N2O [mg/kW-hr]	0.00
Total CO2 [g/hr]	21944.37	Specific CO2 [g/kW-hr]	1363.55
Total CH4 [g/hr]	21.66	Specific CH4 [g/kW-hr]	1.35

EMISSION TESTS:

	Value	Limit	Result
Power	50.20	<96.94 kW	PASS
Soot	4.30	<100 mg/kW-hr	PASS
CO	347.85	<275 g/kW-hr	FAIL
HC + NOX	6.64	<90 g/kW-hr	PASS
E-Score	118.61	>100	PASS
Valid Data for All 5 Modes			PASS

LAB EMISSION TEST FAIL



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Modal Raw Data : Engine / Environmental

ModeNum		1	2	3	4	5
Total Points	points	455	1206	1207	1205	1149
PtsInMode	points	455	1206	1207	1206	1205
Speed	rpm	10208.56	8673.59	7654.11	6625.82	1764.02
Torque	Nm	45.17	21.54	15.62	8.77	0.00
Power	kW	48.29	19.57	12.52	6.09	0.00
BSFC	g/kw-hr	532.94	597.19	638.34	814.27	**
Fuel	g/hr	25733.16	11686.08	7990.84	4954.94	1405.72
T_int	degC	16.70	17.85	16.17	16.79	17.77
RelHumid	%	24.03	21.91	20.83	20.38	20.24
Baro	in Hg	28.82	28.82	28.81	28.82	28.81
Baro	mmHg	732.05	731.93	731.86	731.93	731.85
Pvap kPa	kPa	0.40	0.39	0.33	0.34	0.35
Pvap inHg	inHg	0.12	0.11	0.10	0.10	0.11
AbsHumidity	grains/lb	17.80	17.31	14.97	15.16	15.91
SatPres	kPa	97.20	97.19	97.24	97.24	97.22
Hum Factor		0.79	0.79	0.78	0.78	0.78
F_fac		1.00	1.00	1.00	1.00	1.00
K_fac		1.02	1.02	1.02	1.02	1.02
Humidity	g/kg	2.54	2.47	2.14	2.17	2.27
H2		1.91	1.73	1.68	1.08	1.70
WetDry Factor		0.87	0.87	0.87	0.87	0.88



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Modal Emissions Concentrations

ModeNum		1	2	3	4	5
THC	ppmC1	1769.81	1413.56	1544.04	1419.24	4716.88
CO	%	4.71	4.33	4.23	2.91	4.26
N2O	ppm	0.70	0.47	0.41	0.37	0.55
CH4	ppm	338.26	242.93	263.70	272.07	677.46
CO2	%	10.17	10.39	10.44	11.28	10.09
O2	%	0.00	0.08	0.18	0.23	0.86
CNOx	ppm	29.86	3.18	0.65	0.24	0.15
AHC	ppm	100.41	79.71	89.60	80.99	340.65
C2H2	ppm	3.99	0.51	0.46	0.21	0.18
C2H4	ppm	84.40	42.23	44.28	61.33	285.14
C3H6	ppm	19.76	4.01	4.34	8.09	51.82
C4H6	ppm	28.23	25.61	25.33	13.42	6.01
ETOH	ppm	24.76	20.85	13.71	10.89	7.12
H2O	%	13.17	12.83	12.80	12.88	12.16
HCHO	ppm	3.38	1.48	0.87	0.48	0.72
HCN	ppm	10.74	6.07	5.07	1.54	1.00
HNCO	ppm	23.21	24.26	22.66	12.44	1.60
MECHO	ppm	12.05	1.10	0.16	0.05	9.30
NC5	ppm	46.21	46.17	46.71	31.15	103.96
NH3	ppm	834.39	1199.22	989.31	432.50	78.97
NO	ppm	37.39	3.43	0.32	0.11	0.05
NO2	ppm	0.51	0.62	0.53	0.28	0.26
Soot	mg/m3	1.10	0.88	0.00	0.00	0.15
AFR	:1	10.54	10.80	10.86	11.41	10.51



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Measurement Accuracy (SAE paper 961804)

H2_XLS %	ModalHC_Dry %	ModalFTIR_H2O %	N2 %	Ar %	AFR :1	Tr_Eff -
2.203	0.204	13.171	78.173	0.904	12.374	1.000
1.980	0.162	12.825	77.797	0.899	12.616	0.996
1.924	0.177	12.800	78.158	0.903	12.711	0.991
1.239	0.163	12.883	79.325	0.917	13.328	0.988
1.938	0.537	12.156	78.012	0.902	12.830	0.956

ModalWHC %	ModalC1 %	ModalC8 %	ModalSUM_HC %	ModalT_Emiss %	ModalError %
302.423	0.204	0.025	0.229	98.653	1.347
111.142	0.088	0.011	0.099	97.760	2.240
83.204	0.019	0.002	0.021	98.043	1.957
49.068	-0.031	-0.004	-0.035	97.999	2.001
44.715	-0.206	-0.026	-0.231	97.940	2.060

Power Run

TeamNumber	13
TeamName	Univ of Alaska - Fairbank
Model	UA-F
Engine	UA-F

Displacement cc	499cc
RatedSpeed	10200
RatedTorque	47.0

