



Team Results for Clean Snowmobile Challenge 2017 Team 112



2017 Clean Snowmobile Competition - Lab Emission Event Emission Data Sheet

Test Date : 2017/03/07 11:49:19
Team Name : ETS
Team Number : 112
Model : Kohler
Engine : Kohler
Displacement[cc] : 1028.00
100% Speed : 3457
100% Torque : 59.7
No of Strokes : 4
Fuel : DIESEL H/C: 1.79 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	:	21.8	13.1	6.5	2.5	0.0	6.8
HC_m g/hr	:	0.00	0.00	0.00	0.06	0.00	-0.02
CO_m g/hr	:	0.32	0.25	0.23	0.17	0.14	0.39
NOx_m g/hr	:	71.64	56.35	43.72	30.36	17.97	47.72
Soot_m mg/hr	:	8733.44	5812.62	1156.50	193.40	53.83	2011.35
N2O_m mg/hr	:	0.02	0.02	0.02	0.01	0.01	0.02
CO2_m g/hr	:	23574.08	14130.58	7826.66	3908.84	1298.71	8919.81
CH4_m g/hr	:	0.05	0.04	0.06	0.05	0.03	0.06
W_HC g/hr	:	0.00	0.00	0.00	0.02	0.00	-0.02
W_CO g/hr	:	0.04	0.07	0.06	0.05	0.01	0.39
W_NOx g/hr	:	8.60	15.21	10.93	9.41	0.90	47.72
W_HCNOx g/hr	:	8.60	15.21	10.93	9.43	0.90	47.70
W_Soot mg/hr	:	1048.01	1569.41	289.13	59.95	2.69	2011.35
W_N2O g/hr	:	0.00	0.00	0.00	0.00	0.00	0.02
W_CO2 g/hr	:	2828.89	3815.26	1956.66	1211.74	64.94	8919.81
W_CH4 g/hr	:	0.01	0.01	0.02	0.02	0.00	0.06

Total Weighted Power [kW] 8.564

Weighted Emissions

	HC	CO	NOx	HC+NOx
Total Mass [g/hr]	0.02	0.22	45.05	45.07
Specific Mass [g/kW-hr]	0.00	0.03	5.26	5.26
BSFC [g/kW-hr]	378.2			

Total Soot [mg/hr] 2969.19 Specific Soot [mg/kW-hr] 346.71

Not Used for Competition

Total N2O [mg/hr]	0.02	Specific N2O [mg/kW-hr]	0.00
Total CO2 [g/hr]	9877.49	Specific CO2 [g/kW-hr]	1153.37
Total CH4 [g/hr]	0.05	Specific CH4 [g/kW-hr]	0.01
RMC BSFC [g/kW-hr]	414.33		

EMISSION TESTS:

	Value	Limit	Result
Power	21.62	<96.94 kW	PASS
Soot	346.71	<50 mg/kW-hr	FAIL
CO	0.03	<275 g/kW-hr	PASS
HC + NOX	5.26	<90 g/kW-hr	PASS
E-Score	206.48	>175	PASS
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	3456.42	2952.06	2627.79	2065.74	1142.92	2561.86
Torque	Nm	60.37	42.34	23.70	11.59	0.00	25.20
Power	kW	21.85	13.09	6.52	2.51	0.00	6.76
BSFC	g/kw-hr	338.81	339.03	376.85	489.49	**	414.33
Fuel	g/hr	7403.07	4437.52	2457.90	1227.63	407.90	2801.25
T_int	degC	30.33	39.25	39.23	30.49	31.38	34.57
RelHumid	%	24.43	22.30	22.77	24.06	22.91	23.42
Baro	in Hg	28.23	28.24	28.24	28.24	28.23	28.23
Baro	mmHg	717.02	717.22	717.18	717.24	717.09	717.17
Pvap_kPa	kPa	0.84	1.19	1.22	0.83	0.83	1.00
Pvap_inHg	inHg	0.25	0.35	0.36	0.25	0.25	0.29
AbsHumidity	grains/lb	38.55	55.03	56.15	38.27	38.14	45.85
SatPres	kPa	94.75	94.43	94.40	94.79	94.77	94.62
Hum Factor		0.85	0.91	0.92	0.85	0.85	0.88
F_fac		1.06	1.08	1.08	1.06	1.06	1.07
K_fac		1.06	1.08	1.08	1.06	1.07	1.07
Humidity	g/kg	5.51	7.86	8.02	5.47	5.45	6.55
H2		0.00	0.00	0.00	0.00	0.00	0.00
WetDry Factor		0.88	0.91	0.94	0.96	0.97	1.00



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Modal Emissions Concentrations

ModeNum		1	2	3	4	5	RMC
THC	ppmC1	0.00	0.00	0.00	2.10	0.00	-0.38
CO	%	0.00	0.00	0.00	0.00	0.00	0.00
N2O	ppm	1.14	1.02	1.22	1.51	0.96	1.25
CH4	ppm	0.66	0.71	1.37	1.52	1.34	1.18
CO2	%	12.20	9.36	6.28	4.05	2.32	6.55
O2	%	1.98	6.43	11.02	13.94	16.26	10.86
CNOx	ppm	354.64	356.90	335.60	301.23	307.57	335.18
AHC	ppm	1.03	0.96	1.17	1.34	1.35	1.18
C2H2	ppm	1.06	0.50	0.31	0.46	0.30	0.51
C2H4	ppm	0.31	0.37	0.45	1.01	0.24	0.52
C3H6	ppm	0.53	0.67	0.69	0.57	0.79	0.66
C4H6	ppm	0.63	0.75	0.55	0.39	0.55	0.57
ETOH	ppm	0.00	0.00	0.00	0.00	0.00	0.00
H2O	%	11.79	9.13	6.32	4.43	2.94	0.00
HCHO	ppm	0.69	0.61	0.87	1.74	0.67	1.08
HCN	ppm	0.36	0.43	0.32	0.36	0.48	0.40
HNCO	ppm	2.50	2.45	2.51	2.31	2.22	2.50
MECHO	ppm	0.26	0.07	0.11	0.16	0.03	0.16
NC5	ppm	0.00	0.00	0.00	0.00	0.00	0.00
NH3	ppm	1.28	0.13	0.19	0.27	0.24	0.57
NO	ppm	414.29	288.67	216.68	273.61	178.66	290.17
NO2	ppm	1.35	101.75	148.65	79.64	182.27	90.94
Soot	mg/m3	82.93	70.49	17.14	3.80	1.86	26.94
AFR	:1	15.45	20.52	30.85	47.13	81.55	29.92



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Measurement Accuracy (SAE paper 961804)

ModeNum	H2_XLS %	ModalHC_Dry %	ModalFTIR_H2O %	N2 %	Ar %	AFR :1	Tr_Eff -
1	0.000	0.000	11.789	81.821	0.946	16.098	0.900
2	0.000	0.000	9.129	81.663	0.944	21.334	0.680
3	0.000	0.000	6.325	80.546	0.931	32.004	0.459
4	0.000	0.000	4.430	78.344	0.906	48.812	0.323
5	0.000	0.000	2.938	76.753	0.887	84.354	0.217

ModeNum	ModalWHC %	ModalC1 %	ModalC8 %	ModalSUM_HC %	ModalT_Emiss %	ModalError %
1	0.000	**	**	**	**	**
2	0.000	**	**	**	**	**
3	0.000	-3.629	-0.454	-4.082	95.904	4.096
4	0.063	-2.873	-0.359	-3.233	94.881	5.119
5	0.000	**	**	**	**	**

Power Run

Team 112

TeamNumber	112
TeamName	ETS
Model	Kohler
Engine	Kohler

Displacement cc	1028.00
RatedSpeed	3457
RatedTorque	59.7

