



Team Results for Clean Snowmobile Challenge 2016 Team 7



2016 Clean Snowmobile Competition - Lab Emission Event Emission Data Sheet

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Test Date       : 2016/03/10 09:30:06
Team Name      : Platteville
Team Number    : 7
Model         : Yamaha
Engine        : Yamaha
Displacement[cc] : 1050.00
100% Speed    : 8800
100% Torque   : 95.3
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 | : | 87.9 | 38.1 | 27.1 | 10.9 | 0.0 | 26.7 |
| HC_m g/hr | : | 314.55 | 24.11 | 48.41 | 11.03 | 18.29 | 19.04 |
| CO_m g/hr | : | 14897.07 | 130.83 | 199.50 | 471.64 | 498.36 | 1357.99 |
| NOx_m g/hr | : | 333.56 | 557.69 | 141.64 | 10.45 | 0.21 | 190.99 |
| Soot_m mg/hr | : | 33.37 | 0.00 | 34.21 | 0.00 | 0.02 | 10.16 |
| N2O_m mg/hr | : | 0.45 | 0.17 | 0.08 | 0.02 | 0.01 | 0.10 |
| CO2_m g/hr | : | 57861.99 | 33016.21 | 25388.70 | 14339.46 | 3045.45 | 27090.57 |
| CH4_m g/hr | : | 47.61 | 4.82 | 5.03 | 3.90 | 3.57 | 9.76 |
| W_HC g/hr | : | 37.75 | 6.51 | 12.10 | 3.42 | 0.91 | 19.04 |
| W_CO g/hr | : | 1787.65 | 35.32 | 49.88 | 146.21 | 24.92 | 1357.99 |
| W_NOx g/hr | : | 40.03 | 150.58 | 35.41 | 3.24 | 0.01 | 190.99 |
| W_HCNOx g/hr | : | 77.77 | 157.08 | 47.51 | 6.66 | 0.93 | 210.04 |
| W_Soot mg/hr | : | 4.00 | 0.00 | 8.55 | 0.00 | 0.00 | 10.16 |
| W_N2O g/hr | : | 0.05 | 0.05 | 0.02 | 0.01 | 0.00 | 0.10 |
| W_CO2 g/hr | : | 6943.44 | 8914.38 | 6347.17 | 4445.23 | 152.27 | 27090.57 |
| W_CH4 g/hr | : | 5.71 | 1.30 | 1.26 | 1.21 | 0.18 | 9.76 |

Total Weighted Power [kW] 30.984

Weighted Emissions

| | HC | CO | NOx | HC+NOx |
|-------------------------|-------|---------|--------|--------|
| Total Mass [g/hr] | 60.69 | 2043.98 | 229.26 | 289.96 |
| Specific Mass [g/kW-hr] | 1.96 | 65.97 | 7.40 | 9.36 |
| BSFC [g/kW-hr] | 324.3 | | | |

Total Soot [mg/hr] 12.56 Specific Soot [mg/kW-hr] 0.41

Not Used for Competition

| | | | |
|--------------------|----------|-------------------------|--------|
| Total N2O [mg/hr] | 0.13 | Specific N2O [mg/kW-hr] | 0.00 |
| Total CO2 [g/hr] | 26802.49 | Specific CO2 [g/kW-hr] | 865.05 |
| Total CH4 [g/hr] | 9.66 | Specific CH4 [g/kW-hr] | 0.31 |
| RMC BSFC [g/kW-hr] | 348.93 | | |

EMISSION TESTS:

| | Value | Limit | Result |
|----------------------------|--------|--------------|--------|
| Power | 87.82 | <96.94 kW | PASS |
| Soot | 0.41 | <50 mg/kW-hr | PASS |
| CO | 65.97 | <275 g/kW-hr | PASS |
| HC + NOX | 9.36 | <90 g/kW-hr | PASS |
| E-Score | 187.27 | >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 | 12031 |
| PtsInMode | points | 1210 | 3050 | 2720 | 3470 | 1480 | 12031 |
| Speed | rpm | 8799.55 | 7480.35 | 6854.42 | 5720.79 | 1519.54 | 6556.36 |
| Torque | Nm | 95.38 | 48.62 | 37.81 | 18.14 | 0.00 | 38.95 |
| Power | kW | 87.89 | 38.09 | 27.14 | 10.87 | 0.00 | 26.75 |
| BSFC | g/kw-hr | 298.26 | 278.58 | 303.60 | 443.30 | ** | 348.93 |
| Fuel | g/hr | 26213.01 | 10611.13 | 8239.11 | 4816.85 | 1238.34 | 9332.16 |
| T_int | degC | 18.94 | 19.50 | 20.51 | 20.64 | 20.32 | 20.23 |
| RelHumid | % | 32.90 | 29.88 | 29.44 | 31.02 | 29.44 | 30.83 |
| Baro | in Hg | 28.95 | 28.95 | 28.95 | 28.96 | 28.95 | 28.95 |
| Baro | mmHg | 735.44 | 735.42 | 735.38 | 735.48 | 735.42 | 735.43 |
| Pvap_kPa | kPa | 0.62 | 0.58 | 0.60 | 0.64 | 0.59 | 0.62 |
| Pvap_inHg | inHg | 0.18 | 0.17 | 0.18 | 0.19 | 0.18 | 0.18 |
| AbsHumidity | grains/lb | 27.54 | 25.79 | 26.87 | 28.51 | 26.58 | 27.70 |
| SatPres | kPa | 97.43 | 97.47 | 97.44 | 97.42 | 97.45 | 97.43 |
| Hum Factor | | 0.82 | 0.81 | 0.82 | 0.82 | 0.81 | 0.82 |
| F_fac | | 1.00 | 1.00 | 1.01 | 1.01 | 1.01 | 1.01 |
| K_fac | | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 |
| Humidity | g/kg | 3.93 | 3.68 | 3.84 | 4.07 | 3.80 | 3.96 |
| H2 | | 1.67 | 0.03 | 0.05 | 0.23 | 1.08 | 0.34 |
| WetDry Factor | | 0.86 | 0.87 | 0.86 | 0.86 | 0.86 | 1.00 |



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Modal Emissions Concentrations

| ModeNum | | 1 | 2 | 3 | 4 | 5 | RMC |
|---------|-------|---------|---------|--------|--------|---------|---------|
| THC | ppmC1 | 1708.07 | 296.37 | 786.38 | 308.52 | 2054.41 | 273.75 |
| CO | % | 4.05 | 0.08 | 0.16 | 0.66 | 2.80 | 0.98 |
| N2O | ppm | 7.75 | 6.81 | 3.89 | 1.62 | 4.97 | 4.53 |
| CH4 | ppm | 226.63 | 51.93 | 71.64 | 95.48 | 351.25 | 123.03 |
| CO2 | % | 10.01 | 12.94 | 13.14 | 12.78 | 10.90 | 12.41 |
| O2 | % | 0.00 | 0.51 | 0.10 | 0.00 | 0.00 | 0.16 |
| CNOx | ppm | 552.19 | 2090.25 | 701.39 | 89.04 | 7.27 | 836.98 |
| AHC | ppm | 69.93 | 4.04 | 20.98 | 2.70 | 64.43 | 21.73 |
| C2H2 | ppm | 15.14 | 6.92 | 6.88 | 3.50 | 15.60 | 7.43 |
| C2H4 | ppm | 152.29 | 50.05 | 66.18 | 29.65 | 221.08 | 80.43 |
| C3H6 | ppm | 47.54 | 7.09 | 27.74 | 4.22 | 41.18 | 21.21 |
| C4H6 | ppm | 28.60 | 2.50 | 6.21 | 5.02 | 7.92 | 9.03 |
| ETOH | ppm | 10.46 | 1.02 | 6.28 | 2.86 | 2.37 | 5.14 |
| H2O | % | 13.75 | 13.48 | 13.74 | 13.97 | 13.88 | 0.00 |
| HCHO | ppm | 3.87 | 12.74 | 16.23 | 2.69 | 5.18 | 9.28 |
| HCN | ppm | 25.09 | 3.93 | 3.33 | 2.20 | 2.85 | 6.40 |
| HNCO | ppm | 4.10 | 1.88 | 2.31 | 1.37 | 0.02 | 2.29 |
| MECHO | ppm | 5.58 | 1.03 | 5.67 | 0.09 | 1.15 | 2.83 |
| NC5 | ppm | 42.22 | 2.38 | 28.34 | 10.07 | 41.41 | 26.98 |
| NH3 | ppm | 523.31 | 1.16 | 14.16 | 97.51 | 63.39 | 127.22 |
| NO | ppm | 675.50 | 2570.90 | 859.82 | 107.43 | 7.75 | 1021.29 |
| NO2 | ppm | 0.21 | 2.83 | 1.14 | 1.03 | 1.19 | 1.35 |
| Soot | mg/m3 | 0.11 | 0.00 | 0.32 | 0.00 | 0.00 | 0.09 |
| AFR | :1 | 11.85 | 14.40 | 13.86 | 13.70 | 12.26 | 13.70 |



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Measurement Accuracy (SAE paper 961804)

| ModeNum | H2_XLS % | ModalHC_Dry % | ModalFTIR_H2O % | N2 % | Ar % | AFR :1 | Tr_Eff - |
|---------|-------------|------------------|--------------------|---------|---------|-----------|-------------|
| 1 | 1.935 | 0.198 | 13.750 | 77.641 | 0.897 | 12.692 | 1.000 |
| 2 | 0.031 | 0.034 | 13.484 | 83.624 | 0.967 | 15.157 | 0.974 |
| 3 | 0.063 | 0.091 | 13.740 | 83.197 | 0.962 | 14.689 | 0.995 |
| 4 | 0.264 | 0.036 | 13.975 | 82.695 | 0.956 | 14.406 | 1.000 |
| 5 | 1.255 | 0.239 | 13.876 | 78.956 | 0.913 | 13.208 | 1.000 |

| ModeNum | ModalWHC % | ModalC1 % | ModalC8 % | ModalSUM_HC % | ModalT_Emiss % | ModalError % |
|---------|---------------|--------------|--------------|------------------|-------------------|-----------------|
| 1 | 314.551 | 0.198 | 0.025 | 0.223 | 97.080 | 2.920 |
| 2 | 24.106 | -0.357 | -0.045 | -0.401 | 100.153 | 0.153 |
| 3 | 48.413 | 0.012 | 0.002 | 0.014 | 99.875 | 0.125 |
| 4 | 11.034 | 0.036 | 0.004 | 0.040 | 99.588 | 0.412 |
| 5 | 18.288 | 0.239 | 0.030 | 0.268 | 97.306 | 2.694 |

Power Run

Team 7

| | |
|------------|-------------|
| TeamNumber | 7 |
| TeamName | Platteville |
| Model | Yamaha |
| Engine | Yamaha |

| | |
|-----------------|---------|
| Displacement cc | 1050.00 |
| RatedSpeed | 8800 |
| RatedTorque | 95.3 |

