# Appendix 03 – 01 Engine Specification Sheets

## Main Generators (EM2120)

# PERFORMANCE DATA[EM2120]

September 22, 2023

**Performance Number: EM2120** **Change Level: 02**

| | | | |
|---|---|---|---|
| **SALES MODEL:** | 3516E | **COMBUSTION:** | DIRECT INJECTION |
| **BRAND:** | CAT | **ENGINE SPEED (RPM):** | 1,808 |
| **MACHINE SALES MODEL:** | | **HERTZ:** | 50 |
| **ENGINE POWER (BKW):** | 3,086.0 | **FAN POWER (KW):** | 120.0 |
| **GEN POWER WITH FAN (EKW):** | 2,800.0 | **ADDITIONAL PARASITICS (KW):** | 18.0 |
| **COMPRESSION RATIO:** | 14.7 | **ASPIRATION:** | TA |
| **RATING LEVEL:** | MISSION CRITICAL STANDBY | **AFTERCOOLER TYPE:** | ATAAC |
| **PUMP QUANTITY:** | 1 | **AFTERCOOLER CIRCUIT TYPE:** | JW+OC, ATAAC |
| **FUEL TYPE:** | DIESEL | **INLET MANIFOLD AIR TEMP (C):** | 50 |
| **MANIFOLD TYPE:** | DRY | **JACKET WATER TEMP (C):** | 104 |
| **GOVERNOR TYPE:** | ADEM5 | **TURBO CONFIGURATION:** | PARALLEL |
| **ELECTRONICS TYPE:** | ADEM5 | **TURBO QUANTITY:** | 4 |
| **IGNITION TYPE:** | CI | **TURBOCHARGER MODEL:** | GTB6051N-44T-1.25 |
| **INJECTOR TYPE:** | EUI | **CERTIFICATION YEAR:** | 2018 |
| **FUEL INJECTOR:** | 3920221 | **CRANKCASE BLOWBY RATE (M3/HR):** | 117.0 |
| **UNIT INJECTOR TIMING (MM):** | 64.34 | **FUEL RATE (RATED RPM) NO LOAD (L/HR):** | 61.3 |
| **REF EXH STACK DIAMETER (MM):** | 305 | **PISTON SPD @ RATED ENG SPD (M/SEC):** | 13.0 |
| **MAX OPERATING ALTITUDE (M):** | 250 | | |

| INDUSTRY | SUBINDUSTRY | APPLICATION |
|---|---|---|
| ELECTRIC POWER | STANDARD | PACKAGED GENSET |

## General Performance Data

THE INLET MANIFOLD AIR TEMP LISTED IN THE HEADER, AND IN THE GENERAL PERFORMANCE DATA, IS THE AVERAGE INLET MANIFOLD TEMP FRONT TO REAR ON THE ENGINE.

THIS STANDBY RATING IS FOR A STANDBY ONLY ENGINE ARRANGEMENT. RERATING THE ENGINE TO A STANDARD PRIME OR CONTINUOUS RATING IS NOT PERMITTED.

| GENSET POWER WITH FAN | PERCENT LOAD | ENGINE POWER | BRAKE MEAN EFF PRES (BMEP) | BRAKE SPEC FUEL CONSUMPTN (BSFC) | ISO BRAKE SPEC FUEL CONSUMPTN (BSFC) | VOL FUEL CONSUMPTN (VFC) | ISO VOL FUEL CONSUMPTN (VFC) | ELEC SPEC FUEL CONSUMPTN (ESFC) | ISO ELEC SPEC FUEL CONSUMPTN (ESFC) |
|---|---|---|---|---|---|---|---|---|---|
| EKW | % | BKW | KPA | G/BKW-HR | G/BKW-HR | L/HR | L/HR | G/EKW-HR | G/EKW-HR |
| 2,800.0 | 100 | 3,085 | 2,623 | 208.6 | 204.6 | 757.1 | 742.7 | 229.8 | 225.5 |
| 2,520.0 | 90 | 2,791 | 2,372 | 204.1 | 200.2 | 669.9 | 657.2 | 226.0 | 221.7 |
| 2,240.0 | 80 | 2,496 | 2,122 | 205.2 | 201.3 | 602.5 | 591.0 | 228.6 | 224.3 |
| 2,100.0 | 75 | 2,349 | 1,996 | 206.5 | 202.6 | 570.5 | 559.7 | 230.9 | 226.5 |
| 1,960.0 | 70 | 2,201 | 1,871 | 208.2 | 204.3 | 539.2 | 529.0 | 233.9 | 229.4 |
| 1,680.0 | 60 | 1,906 | 1,621 | 213.1 | 209.1 | 478.0 | 468.9 | 241.9 | 237.3 |
| 1,400.0 | 50 | 1,612 | 1,370 | 219.5 | 215.3 | 416.1 | 408.2 | 252.7 | 247.8 |
| 1,120.0 | 40 | 1,317 | 1,119 | 225.8 | 221.5 | 349.9 | 343.2 | 265.5 | 260.5 |
| 840.0 | 30 | 1,022 | 869 | 232.4 | 228.0 | 279.5 | 274.2 | 282.8 | 277.5 |
| 700.0 | 25 | 875 | 744 | 237.9 | 233.4 | 244.9 | 240.2 | 297.3 | 291.7 |
| 560.0 | 20 | 727 | 618 | 247.0 | 242.3 | 211.4 | 207.4 | 320.9 | 314.8 |
| 280.0 | 10 | 433 | 368 | 279.7 | 274.4 | 142.4 | 139.7 | 432.3 | 424.1 |

| GENSET POWER WITH FAN | PERCENT LOAD | ENGINE POWER | INLET MFLD PRES | INLET MFLD TEMP | EXH MFLD TEMP | EXH MFLD PRES | ENGINE OUTLET TEMP | COMPRESSOR OUTLET PRES | COMPRESSOR OUTLET TEMP |
|---|---|---|---|---|---|---|---|---|---|
| EKW | % | BKW | KPA | DEG C | DEG C | KPA | DEG C | KPA | DEG C |
| 2,800.0 | 100 | 3,085 | 311.0 | 49.4 | 690.8 | 245.6 | 489.6 | 331 | 250.0 |
| 2,520.0 | 90 | 2,791 | 278.8 | 41.7 | 643.9 | 215.5 | 462.2 | 298 | 226.7 |
| 2,240.0 | 80 | 2,496 | 251.6 | 39.2 | 621.4 | 191.7 | 452.8 | 269 | 210.4 |
| 2,100.0 | 75 | 2,349 | 237.0 | 38.2 | 613.6 | 180.0 | 451.2 | 254 | 202.4 |
| 1,960.0 | 70 | 2,201 | 222.4 | 37.3 | 606.3 | 168.6 | 450.2 | 239 | 194.6 |
| 1,680.0 | 60 | 1,906 | 193.4 | 35.8 | 592.6 | 146.5 | 449.2 | 208 | 179.0 |
| 1,400.0 | 50 | 1,612 | 165.0 | 35.1 | 575.4 | 125.7 | 445.1 | 178 | 160.5 |
| 1,120.0 | 40 | 1,317 | 129.6 | 33.9 | 557.2 | 100.7 | 444.4 | 142 | 137.7 |
| 840.0 | 30 | 1,022 | 90.6 | 33.9 | 529.9 | 74.9 | 436.6 | 101 | 111.9 |
| 700.0 | 25 | 875 | 72.8 | 33.7 | 509.4 | 62.8 | 427.3 | 82 | 99.2 |
| 560.0 | 20 | 727 | 57.3 | 33.2 | 482.1 | 52.6 | 411.7 | 66 | 87.2 |
| 280.0 | 10 | 433 | 29.4 | 32.0 | 390.7 | 34.2 | 343.8 | 36 | 64.3 |

## General Performance Data (Continued)

| GENSET POWER | PERCENT LOAD | ENGINE POWER | WET INLET AIR VOL | ENGINE OUTLET | WET INLET AIR | WET EXH GAS | ENGINE OUTLET | ENGINE OUTLET |
|---|---|---|---|---|---|---|---|---|

# PERFORMANCE DATA[EM2120]

September 22, 2023

| WITH FAN | | | FLOW RATE | WET EXH GAS VOL FLOW RATE | MASS FLOW RATE | MASS FLOW RATE | WET EXH VOL FLOW RATE (0 DEG C AND 101 KPA) | DRY EXH VOL FLOW RATE (0 DEG C AND 101 KPA) |
|---|---|---|---|---|---|---|---|---|
| EKW | % | BKW | M3/MIN | M3/MIN | KG/HR | KG/HR | M3/MIN | M3/MIN |
| 2,800.0 | 100 | 3,085 | 240.6 | 649.5 | 17,008.6 | 17,650.8 | 232.6 | 212.1 |
| 2,520.0 | 90 | 2,791 | 227.3 | 587.2 | 16,028.8 | 16,598.2 | 218.1 | 199.7 |
| 2,240.0 | 80 | 2,496 | 213.9 | 542.4 | 15,018.0 | 15,529.7 | 204.1 | 187.4 |
| 2,100.0 | 75 | 2,349 | 205.5 | 518.4 | 14,398.1 | 14,882.8 | 195.5 | 179.7 |
| 1,960.0 | 70 | 2,201 | 196.7 | 494.6 | 13,754.5 | 14,212.7 | 186.8 | 171.8 |
| 1,680.0 | 60 | 1,906 | 180.6 | 451.8 | 12,594.3 | 13,000.5 | 170.8 | 157.5 |
| 1,400.0 | 50 | 1,612 | 164.3 | 404.4 | 11,345.5 | 11,699.3 | 153.8 | 142.2 |
| 1,120.0 | 40 | 1,317 | 143.3 | 349.1 | 9,815.2 | 10,112.7 | 132.9 | 122.9 |
| 840.0 | 30 | 1,022 | 118.1 | 283.4 | 8,059.2 | 8,296.8 | 109.1 | 101.0 |
| 700.0 | 25 | 875 | 106.8 | 251.7 | 7,270.8 | 7,479.2 | 98.2 | 91.1 |
| 560.0 | 20 | 727 | 97.2 | 223.7 | 6,610.6 | 6,790.6 | 89.2 | 83.0 |
| 280.0 | 10 | 433 | 79.7 | 164.8 | 5,408.4 | 5,529.4 | 73.0 | 68.5 |

## Heat Rejection Data

| GENSET POWER WITH FAN | PERCENT LOAD | ENGINE POWER | REJECTION TO JACKET WATER | REJECTION TO ATMOSPHERE | REJECTION TO EXH | EXH RECOVERY TO 177C | FROM OIL COOLER | FROM AFTERCOOLER | WORK ENERGY | LOW HEAT VALUE ENERGY | HIGH HEAT VALUE ENERGY |
|---|---|---|---|---|---|---|---|---|---|---|---|
| EKW | % | BKW | KW | KW | KW | KW | KW | KW | KW | KW | KW |
| 2,800.0 | 100 | 3,085 | 918 | 167 | 2,961 | 1,638 | 407 | 1,013 | 3,085 | 7,648 | 8,147 |
| 2,520.0 | 90 | 2,791 | 838 | 149 | 2,556 | 1,397 | 360 | 872 | 2,791 | 6,767 | 7,209 |

## Emissions Data

**DIESEL**

**RATED SPEED NOMINAL DATA: 1808 RPM**

| GENSET POWER WITH FAN | | EKW | 2,800.0 | 2,100.0 | 1,400.0 | 700.0 | 280.0 |
|---|---|---|---|---|---|---|---|
| PERCENT LOAD | | % | 100 | 75 | 50 | 25 | 10 |
| ENGINE POWER | | BKW | 3,085 | 2,349 | 1,612 | 875 | 433 |
| TOTAL NOX (AS NO2) | | G/HR | 20,380 | 13,146 | 6,755 | 3,705 | 3,901 |
| TOTAL CO | | G/HR | 3,610 | 1,053 | 692 | 1,090 | 1,139 |
| TOTAL HC | | G/HR | 258 | 272 | 265 | 232 | 190 |
| TOTAL CO2 | | KG/HR | 2,013 | 1,519 | 1,103 | 646 | 375 |
| PART MATTER | | G/HR | 244.1 | 111.1 | 106.6 | 121.9 | 84.6 |
| TOTAL NOX (AS NO2) | (CORR 5% O2) | MG/NM3 | 2,232.3 | 1,909.7 | 1,366.0 | 1,265.0 | 2,567.7 |
| TOTAL CO | (CORR 5% O2) | MG/NM3 | 408.2 | 158.2 | 143.1 | 393.0 | 680.7 |
| TOTAL HC | (CORR 5% O2) | MG/NM3 | 25.3 | 35.3 | 47.5 | 72.0 | 95.4 |
| PART MATTER | (CORR 5% O2) | MG/NM3 | 22.9 | 14.0 | 18.8 | 36.9 | 43.7 |
| TOTAL NOX (AS NO2) | (CORR 15% O2) | MG/NM3 | 828.3 | 708.6 | 506.9 | 469.4 | 952.8 |
| TOTAL CO | (CORR 15% O2) | MG/NM3 | 151.5 | 58.7 | 53.1 | 145.8 | 252.6 |
| TOTAL HC | (CORR 15% O2) | MG/NM3 | 9.4 | 13.1 | 17.6 | 26.7 | 35.4 |
| PART MATTER | (CORR 15% O2) | MG/NM3 | 8.5 | 5.2 | 7.0 | 13.7 | 16.2 |
| TOTAL NOX (AS NO2) | (CORR 5% O2) | PPM | 1,087 | 930 | 665 | 616 | 1,251 |
| TOTAL CO | (CORR 5% O2) | PPM | 327 | 127 | 114 | 314 | 545 |
| TOTAL HC | (CORR 5% O2) | PPM | 47 | 66 | 89 | 134 | 178 |
| TOTAL NOX (AS NO2) | (CORR 15% O2) | PPM | 403 | 345 | 247 | 229 | 464 |
| TOTAL CO | (CORR 15% O2) | PPM | 121 | 47 | 42 | 117 | 202 |
| TOTAL HC | (CORR 15% O2) | PPM | 18 | 24 | 33 | 50 | 66 |
| TOTAL NOX (AS NO2) | | G/HP-HR | 4.98 | 4.21 | 3.15 | 3.17 | 6.75 |
| TOTAL CO | | G/HP-HR | 0.88 | 0.34 | 0.32 | 0.93 | 1.97 |
| TOTAL HC | | G/HP-HR | 0.06 | 0.09 | 0.12 | 0.20 | 0.33 |
| PART MATTER | | G/HP-HR | 0.06 | 0.04 | 0.05 | 0.10 | 0.15 |
| TOTAL NOX (AS NO2) | | G/KW-HR | 6.78 | 5.73 | 4.28 | 4.31 | 9.18 |
| TOTAL CO | | G/KW-HR | 1.20 | 0.46 | 0.44 | 1.27 | 2.68 |
| TOTAL HC | | G/KW-HR | 0.09 | 0.12 | 0.17 | 0.27 | 0.45 |
| PART MATTER | | G/KW-HR | 0.08 | 0.05 | 0.07 | 0.14 | 0.20 |
| TOTAL NOX (AS NO2) | | LB/HR | 44.93 | 28.98 | 14.89 | 8.17 | 8.60 |

# PERFORMANCE DATA[EM2120]

| | | | | | | |
|---|---|---|---|---|---|---|
| TOTAL CO | LB/HR | 7.96 | 2.32 | 1.52 | 2.40 | 2.51 |
| TOTAL HC | LB/HR | 0.57 | 0.60 | 0.58 | 0.51 | 0.42 |
| TOTAL CO2 | LB/HR | 4,438 | 3,349 | 2,431 | 1,424 | 826 |
| PART MATTER | LB/HR | 0.54 | 0.24 | 0.24 | 0.27 | 0.19 |
| OXYGEN IN EXH | % | 9.5 | 10.7 | 11.6 | 12.4 | 14.3 |
| DRY SMOKE OPACITY | % | 3.5 | 1.7 | 2.0 | 3.3 | 2.4 |
| BOSCH SMOKE NUMBER | | 1.18 | 0.58 | 0.66 | 1.13 | 0.81 |

**RATED SPEED POTENTIAL SITE VARIATION: 1808 RPM**

| **GENSET POWER WITH FAN** | | **EKW** | **2,800.0** | **2,100.0** | **1,400.0** | **700.0** | **280.0** |
|---|---|---|---|---|---|---|---|
| **PERCENT LOAD** | | **%** | **100** | **75** | **50** | **25** | **10** |
| **ENGINE POWER** | | **BKW** | **3,085** | **2,349** | **1,612** | **875** | **433** |
| TOTAL NOX (AS NO2) | | G/HR | 24,456 | 15,776 | 8,106 | 4,446 | 4,682 |
| TOTAL CO | | G/HR | 5,054 | 1,475 | 968 | 1,526 | 1,595 |
| TOTAL HC | | G/HR | 343 | 361 | 352 | 309 | 253 |
| PART MATTER | | G/HR | 341.8 | 155.6 | 149.3 | 170.7 | 118.4 |
| TOTAL NOX (AS NO2) | (CORR 5% O2) | MG/NM3 | 2,678.8 | 2,291.7 | 1,639.2 | 1,518.0 | 3,081.3 |
| TOTAL CO | (CORR 5% O2) | MG/NM3 | 571.5 | 221.5 | 200.3 | 550.2 | 953.0 |
| TOTAL HC | (CORR 5% O2) | MG/NM3 | 33.6 | 47.0 | 63.2 | 95.7 | 126.8 |
| PART MATTER | (CORR 5% O2) | MG/NM3 | 32.1 | 19.6 | 26.3 | 51.7 | 61.2 |
| TOTAL NOX (AS NO2) | (CORR 15% O2) | MG/NM3 | 994.0 | 850.4 | 608.3 | 563.3 | 1,143.4 |
| TOTAL CO | (CORR 15% O2) | MG/NM3 | 212.1 | 82.2 | 74.3 | 204.2 | 353.6 |
| TOTAL HC | (CORR 15% O2) | MG/NM3 | 12.5 | 17.4 | 23.5 | 35.5 | 47.1 |
| PART MATTER | (CORR 15% O2) | MG/NM3 | 11.9 | 7.3 | 9.8 | 19.2 | 22.7 |
| TOTAL NOX (AS NO2) | (CORR 5% O2) | PPM | 1,305 | 1,116 | 798 | 739 | 1,501 |
| TOTAL CO | (CORR 5% O2) | PPM | 457 | 177 | 160 | 440 | 762 |
| TOTAL HC | (CORR 5% O2) | PPM | 63 | 88 | 118 | 179 | 237 |
| TOTAL NOX (AS NO2) | (CORR 15% O2) | PPM | 484 | 414 | 296 | 274 | 557 |
| TOTAL CO | (CORR 15% O2) | PPM | 170 | 66 | 59 | 163 | 283 |
| TOTAL HC | (CORR 15% O2) | PPM | 23 | 33 | 44 | 66 | 88 |
| TOTAL NOX (AS NO2) | | G/HP-HR | 5.98 | 5.06 | 3.78 | 3.81 | 8.10 |
| TOTAL CO | | G/HP-HR | 1.24 | 0.47 | 0.45 | 1.31 | 2.76 |
| TOTAL HC | | G/HP-HR | 0.08 | 0.12 | 0.16 | 0.26 | 0.44 |
| PART MATTER | | G/HP-HR | 0.08 | 0.05 | 0.07 | 0.15 | 0.20 |
| TOTAL NOX (AS NO2) | | G/KW-HR | 8.13 | 6.87 | 5.13 | 5.18 | 11.01 |
| TOTAL CO | | G/KW-HR | 1.68 | 0.64 | 0.61 | 1.78 | 3.75 |
| TOTAL HC | | G/KW-HR | 0.11 | 0.16 | 0.22 | 0.36 | 0.59 |
| PART MATTER | | G/KW-HR | 0.11 | 0.07 | 0.09 | 0.20 | 0.28 |
| TOTAL NOX (AS NO2) | | LB/HR | 53.92 | 34.78 | 17.87 | 9.80 | 10.32 |
| TOTAL CO | | LB/HR | 11.14 | 3.25 | 2.13 | 3.37 | 3.52 |
| TOTAL HC | | LB/HR | 0.76 | 0.80 | 0.78 | 0.68 | 0.56 |
| PART MATTER | | LB/HR | 0.75 | 0.34 | 0.33 | 0.38 | 0.26 |

## Regulatory Information

| **EPA EMERGENCY STATIONARY** | | | **2011 - ----** | |
|---|---|---|---|---|
| GASEOUS EMISSIONS DATA MEASUREMENTS PROVIDED TO THE EPA ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 60 SUBPART IIII AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THE "MAX LIMITS" SHOWN BELOW ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE EMERGENCY STATIONARY REGULATIONS. | | | | |
| **Locality** | **Agency** | **Regulation** | **Tier/Stage** | **Max Limits - G/BKW - HR** |
| U.S. (INCL CALIF) | EPA | STATIONARY | EMERGENCY STATIONARY | CO: 3.5 NOx + HC: 6.4 PM: 0.20 |

## Altitude Derate Data

THE TEMPERATURES LISTED IN THE CHART ARE AMBIENT TEMPERATURES. THE FOLLOWING DERATE CHART WAS CALCULATED ASSUMING A 5 DEG C RISE IN AIR TEMPERATURE BETWEEN AMBIENT AND THE TURBOCHARGER INLET.

**STANDARD**

**ALTITUDE CORRECTED POWER CAPABILITY (BKW)**

| **AMBIENT** | **0** | **5** | **10** | **15** | **20** | **25** | **30** | **35** | **40** | **45** | **50** | **55** | **60** | **NORMAL** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

# PERFORMANCE DATA[EM2120]

September 22, 2023

| OPERATING TEMP (C) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ALTITUDE (M) | | | | | | | | | | | | | | |
| 0 | 3,086 | 3,086 | 3,086 | 3,086 | 3,086 | 3,086 | 3,086 | 3,086 | 3,086 | 3,086 | 3,086 | 3,086 | 3,071 | 3,086 |
| 250 | 3,086 | 3,086 | 3,086 | 3,086 | 3,086 | 3,086 | 3,086 | 3,086 | 3,086 | 3,086 | 3,086 | 3,037 | 2,956 | 3,086 |
| 500 | 3,086 | 3,086 | 3,054 | 3,054 | 3,054 | 3,054 | 3,054 | 3,051 | 2,995 | 2,912 | 2,812 | 2,732 | 2,728 | 3,054 |
| 750 | 3,025 | 3,025 | 3,025 | 3,024 | 3,024 | 3,019 | 2,961 | 2,878 | 2,778 | 2,699 | 2,697 | 2,696 | 2,694 | 3,024 |
| 1,000 | 2,966 | 2,965 | 2,964 | 2,964 | 2,963 | 2,955 | 2,894 | 2,807 | 2,705 | 2,628 | 2,626 | 2,624 | 2,622 | 2,963 |
| 1,250 | 2,897 | 2,896 | 2,895 | 2,894 | 2,893 | 2,883 | 2,817 | 2,725 | 2,622 | 2,557 | 2,555 | 2,553 | 2,551 | 2,894 |
| 1,500 | 2,828 | 2,827 | 2,825 | 2,824 | 2,823 | 2,808 | 2,739 | 2,644 | 2,553 | 2,493 | 2,491 | 2,489 | 2,487 | 2,824 |
| 1,750 | 2,757 | 2,755 | 2,754 | 2,752 | 2,751 | 2,733 | 2,661 | 2,573 | 2,487 | 2,429 | 2,427 | 2,425 | 2,423 | 2,753 |
| 2,000 | 2,678 | 2,676 | 2,675 | 2,673 | 2,671 | 2,650 | 2,583 | 2,501 | 2,415 | 2,342 | 2,339 | 2,338 | 2,335 | 2,674 |
| 2,250 | 2,596 | 2,594 | 2,592 | 2,591 | 2,589 | 2,569 | 2,504 | 2,421 | 2,301 | 2,226 | 2,225 | 2,222 | 2,221 | 2,592 |
| 2,500 | 2,523 | 2,521 | 2,520 | 2,518 | 2,517 | 2,493 | 2,426 | 2,308 | 2,184 | 2,114 | 2,112 | 2,110 | 2,109 | 2,520 |
| 2,750 | 2,451 | 2,449 | 2,448 | 2,446 | 2,445 | 2,415 | 2,317 | 2,192 | 2,072 | 2,013 | 2,012 | 2,010 | 2,008 | 2,448 |
| 3,000 | 2,362 | 2,360 | 2,359 | 2,358 | 2,356 | 2,313 | 2,213 | 2,088 | 1,979 | 1,924 | 1,922 | 1,921 | 1,919 | 2,360 |
| 3,250 | 2,298 | 2,296 | 2,295 | 2,294 | 2,292 | 2,248 | 2,147 | 2,029 | 1,920 | 1,866 | 1,864 | 1,863 | 1,862 | 2,296 |
| 3,500 | 2,235 | 2,234 | 2,233 | 2,231 | 2,230 | 2,184 | 2,086 | 1,971 | 1,861 | 1,809 | 1,808 | 1,807 | 1,805 | 2,234 |
| 3,750 | 2,174 | 2,173 | 2,172 | 2,171 | 2,170 | 2,123 | 2,030 | 1,914 | 1,810 | 1,781 | 1,780 | 1,780 | 1,779 | 2,174 |
| 4,000 | 2,116 | 2,115 | 2,114 | 2,113 | 2,113 | 2,068 | 1,975 | 1,858 | 1,781 | 1,752 | 1,752 | 1,751 | 1,751 | 2,116 |
| 4,250 | 2,051 | 2,050 | 2,049 | 2,049 | 2,048 | 2,000 | 1,905 | 1,806 | 1,741 | 1,713 | 1,713 | 1,713 | 1,713 | 2,051 |
| 4,500 | 1,968 | 1,967 | 1,967 | 1,967 | 1,966 | 1,913 | 1,825 | 1,754 | 1,684 | 1,658 | 1,659 | 1,659 | 1,659 | 1,968 |

## Cross Reference

| Test Spec | Setting | Engine Arrangement | Engineering Model | Engineering Model Version | Start Effective Serial Number | End Effective Serial Number |
|---|---|---|---|---|---|---|
| 4577279 | LL1873 | 5272963 | PG270 | - | GWZ00001 | |

## Performance Parameter Reference

**Parameters Reference:DM9600-14**

**PERFORMANCE DEFINITIONS**

PERFORMANCE DEFINITIONS DM9600
APPLICATION:
Engine performance tolerance values below are representative of a typical production engine tested in a calibrated dynamometer test cell at SAE J1995 standard reference conditions. Caterpillar maintains ISO9001:2000 certified quality management systems for engine test Facilities to assure accurate calibration of test equipment. Engine test data is corrected in accordance with SAE J1995. Additional reference material SAE J1228, J1349, ISO 8665, 3046-1:2002E, 3046-3:1989, 1585, 2534, 2288, and 9249 may apply in part or are similar to SAE J1995. Special engine rating request (SERR) test data shall be noted.
PERFORMANCE PARAMETER TOLERANCE FACTORS:
Power +/- 3%
Torque +/- 3%
Exhaust stack temperature +/- 8%
Inlet airflow +/- 5%
Intake manifold pressure-gage +/- 10%
Exhaust flow +/- 6%
Specific fuel consumption +/- 3%
Fuel rate +/- 5%
Specific DEF consumption +/- 3%
DEF rate +/- 5%
Heat rejection +/- 5%
Heat rejection exhaust only +/- 10%
Heat rejection CEM only +/- 10%
Heat Rejection values based on using treated water.
Torque is included for truck and industrial applications, do not use for Gen Set or steady state applications.
On C7 - C18 engines, at speeds of 1100 RPM and under these values are provided for reference only, and may not meet the tolerance listed.
On 3500 and C175 engines, at speeds below Peak Torque these values are provided for reference only, and may not meet the tolerance listed.
These values do not apply to C280/3600. For these models, see the tolerances listed below.
C280/3600 HEAT REJECTION TOLERANCE FACTORS:
Heat rejection +/- 10%
Heat rejection to Atmosphere +/- 50%
Heat rejection to Lube Oil +/- 20%

# PERFORMANCE DATA[EM2120]

Heat rejection to Aftercooler +/- 5%
TEST CELL TRANSDUCER TOLERANCE FACTORS:
Torque +/- 0.5%
Speed +/- 0.2%
Fuel flow +/- 1.0%
Temperature +/- 2.0 C degrees
Intake manifold pressure +/- 0.1 kPa
OBSERVED ENGINE PERFORMANCE IS CORRECTED TO SAE J1995 REFERENCE AIR AND FUEL CONDITIONS.
REFERENCE ATMOSPHERIC INLET AIR
FOR 3500 ENGINES AND SMALLER
SAE J1228 AUG2002 for marine engines, and J1995 JAN2014 for other engines, reference atmospheric pressure is 100 KPA (29.61 in hg), and standard temperature is 25deg C (77 deg F) at 30% relative humidity at the stated aftercooler water temp, or inlet manifold temp.
FOR 3600 ENGINES
Engine rating obtained and presented in accordance with ISO 3046/1 and SAE J1995 JANJAN2014 reference atmospheric pressure is 100 KPA (29.61 in hg), and standard temperature is 25deg C (77 deg F) at 30% relative humidity and 150M altitude at the stated aftercooler water temperature.
MEASUREMENT LOCATION FOR INLET AIR TEMPERATURE
Location for air temperature measurement air cleaner inlet at stabilized operating conditions.
REFERENCE EXHAUST STACK DIAMETER
The Reference Exhaust Stack Diameter published with this dataset is only used for the calculation of Smoke Opacity values displayed in this dataset. This value does not necessarily represent the actual stack diameter of the engine due to the variety of exhaust stack adapter options available. Consult the price list, engine order or general dimension drawings for the actual stack diameter size ordered or options available.
REFERENCE FUEL
DIESEL
Reference fuel is #2 distillate diesel with a 35API gravity;
A lower heating value is 42,780 KJ/KG (18,390 BTU/LB) when used at 15 deg C (59 deg F), where the density is 850 G/Liter (7.0936 Lbs/Gal).
GAS
Reference natural gas fuel has a lower heating value of 33.74 KJ/L (905 BTU/CU Ft). Low BTU ratings are based on 18.64 KJ/L (500 BTU/CU FT) lower heating value gas. Propane ratings are based on 87.56 KJ/L (2350 BTU/CU Ft) lower heating value gas.
ENGINE POWER (NET) IS THE CORRECTED FLYWHEEL POWER (GROSS) LESS EXTERNAL AUXILIARY LOAD
Engine corrected gross output includes the power required to drive standard equipment; lube oil, scavenge lube oil, fuel transfer, common rail fuel, separate circuit aftercooler and jacket water pumps. Engine net power available for the external (flywheel) load is calculated by subtracting the sum of auxiliary load from the corrected gross flywheel out put power. Typical auxiliary loads are radiator cooling fans, hydraulic pumps, air compressors and battery charging alternators. For Tier 4 ratings additional Parasitic losses would also include Intake, and Exhaust Restrictions.
ALTITUDE CAPABILITY
Altitude capability is the maximum altitude above sea level at standard temperature and standard pressure at which the engine could develop full rated output power on the current performance data set.
Standard temperature values versus altitude could be seen on TM2001.
When viewing the altitude capability chart the ambient temperature is the inlet air temp at the compressor inlet.
Engines with ADEM MEUI and HEUI fuel systems operating at conditions above the defined altitude capability derate for atmospheric pressure and temperature conditions outside the values defined, see TM2001.
Mechanical governor controlled unit injector engines require a setting change for operation at conditions above the altitude defined on the engine performance sheet. See your Caterpillar technical representative for non standard ratings.
REGULATIONS AND PRODUCT COMPLIANCE
TMI Emissions information is presented at 'nominal' and 'Potential Site Variation' values for standard ratings. No tolerances are applied to the emissions data. These values are subject to change at any time. The controlling federal and local emission requirements need to be verified by your Caterpillar technical representative.
Customer's may have special emission site requirements that need to be verified by the Caterpillar Product Group engineer.
EMISSION CYCLE LIMITS:
Cycle emissions Max Limits apply to cycle-weighted averages only. Emissions at individual load points may exceed the cycle-weighted limit.
WET & DRY EXHAUST/EMISSIONS DESCRIPTION:
Wet - Total exhaust flow or concentration of total exhaust flow

# PERFORMANCE DATA[EM2120]

Dry - Total exhaust flow minus water vapor or concentration of exhaust flow with water vapor excluded
EMISSIONS DEFINITIONS:
Emissions : DM1176
EMISSION CYCLE DEFINITIONS
1. For constant-speed marine engines for ship main propulsion, including,diesel-electric drive, test cycle E2 shall be applied, for controllable-pitch propeller sets
test cycle E2 shall be applied.
2. For propeller-law-operated main and propeller-law-operated auxiliary engines the test cycle E3 shall be applied.
3. For constant-speed auxiliary engines test cycle D2 shall be applied.
4. For variable-speed, variable-load auxiliary engines, not included above, test cycle C1 shall be applied.
HEAT REJECTION DEFINITIONS:
Diesel Circuit Type and HHV Balance : DM9500
HIGH DISPLACEMENT (HD) DEFINITIONS:
3500: EM1500
RATING DEFINITIONS:
Agriculture : TM6008
Fire Pump : TM6009
Generator Set : TM6035
Generator (Gas) : TM6041
Industrial Diesel : TM6010
Industrial (Gas) : TM6040
Irrigation : TM5749
Locomotive : TM6037
Marine Auxiliary : TM6036
Marine Prop (Except 3600) : TM5747
Marine Prop (3600 only) : TM5748
MSHA : TM6042
Oil Field (Petroleum) : TM6011
Off-Highway Truck : TM6039
On-Highway Truck : TM6038
SOUND DEFINITIONS:
Sound Power : DM8702
Sound Pressure : TM7080
Date Released : 10/27/21

## House Generators (EM0777)

# PERFORMANCE DATA[EM0777]

September 22, 2023

**Performance Number: EM0777** **Change Level: 01**

| | | | |
|---|---|---|---|
| **SALES MODEL:** | C32 | **COMBUSTION:** | DIRECT INJECTION |
| **BRAND:** | CAT | **ENGINE SPEED (RPM):** | 1,500 |
| **MACHINE SALES MODEL:** | | **HERTZ:** | 50 |
| **ENGINE POWER (BKW):** | 1,089.0 | **FAN POWER (KW):** | 37.0 |
| **GEN POWER WITH FAN (EKW):** | 1,000.0 | **ASPIRATION:** | TA |
| **COMPRESSION RATIO:** | 15 | **AFTERCOOLER TYPE:** | ATAAC |
| **RATING LEVEL:** | MISSION CRITICAL STANDBY | **AFTERCOOLER CIRCUIT TYPE:** | JW+OC, ATAAC |
| **PUMP QUANTITY:** | 1 | **INLET MANIFOLD AIR TEMP (C):** | 49 |
| **FUEL TYPE:** | DIESEL | **JACKET WATER TEMP (C):** | 89 |
| **MANIFOLD TYPE:** | DRY | **TURBO CONFIGURATION:** | PARALLEL |
| **ELECTRONICS TYPE:** | ADEM4 | **TURBO QUANTITY:** | 2 |
| **IGNITION TYPE:** | CI | **TURBOCHARGER MODEL:** | S510S-0.79A/R |
| **REF EXH STACK DIAMETER (MM):** | 203 | **COMBUSTION STRATEGY:** | LOW BSFC |
| **MAX OPERATING ALTITUDE (M):** | 1,300 | **PISTON SPD @ RATED ENG SPD (M/SEC):** | 8.1 |

| INDUSTRY | SUBINDUSTRY | APPLICATION |
|---|---|---|
| ELECTRIC POWER | STANDARD | PACKAGED GENSET |

## General Performance Data

| GENSET POWER WITH FAN | PERCENT LOAD | ENGINE POWER | BRAKE MEAN EFF PRES (BMEP) | BRAKE SPEC FUEL CONSUMPTN (BSFC) | ISO BRAKE SPEC FUEL CONSUMPTN (BSFC) | VOL FUEL CONSUMPTN (VFC) | ISO VOL FUEL CONSUMPTN (VFC) |
|---|---|---|---|---|---|---|---|
| EKW | % | BKW | KPA | G/BKW-HR | G/BKW-HR | L/HR | L/HR |
| 1,000.0 | 100 | 1,089 | 2,713 | 194.5 | 191.7 | 249.0 | 245.5 |
| 900.0 | 90 | 981 | 2,446 | 192.7 | 189.9 | 222.5 | 219.3 |
| 800.0 | 80 | 875 | 2,181 | 189.7 | 187.0 | 195.3 | 192.5 |
| 750.0 | 75 | 822 | 2,049 | 189.2 | 186.5 | 183.0 | 180.4 |
| 700.0 | 70 | 770 | 1,918 | 189.3 | 186.6 | 171.4 | 168.9 |
| 600.0 | 60 | 664 | 1,656 | 190.1 | 187.4 | 148.6 | 146.5 |
| 500.0 | 50 | 560 | 1,396 | 192.3 | 189.6 | 126.7 | 124.9 |
| 400.0 | 40 | 457 | 1,139 | 196.6 | 193.8 | 105.7 | 104.2 |
| 300.0 | 30 | 354 | 883 | 203.2 | 200.3 | 84.7 | 83.5 |
| 250.0 | 25 | 303 | 754 | 207.8 | 204.8 | 74.0 | 72.9 |
| 200.0 | 20 | 251 | 624 | 213.5 | 210.4 | 62.9 | 62.0 |
| 100.0 | 10 | 145 | 361 | 234.4 | 231.0 | 39.9 | 39.4 |

| GENSET POWER WITH FAN | PERCENT LOAD | ENGINE POWER | INLET MFLD PRES | INLET MFLD TEMP | EXH MFLD TEMP | EXH MFLD PRES | ENGINE OUTLET TEMP | COMPRESSOR OUTLET PRES | COMPRESSOR OUTLET TEMP |
|---|---|---|---|---|---|---|---|---|---|
| EKW | % | BKW | KPA | DEG C | DEG C | KPA | DEG C | KPA | DEG C |
| 1,000.0 | 100 | 1,089 | 255.2 | 53.2 | 652.1 | 209.3 | 464.6 | 270 | 218.2 |
| 900.0 | 90 | 981 | 226.6 | 49.6 | 619.5 | 181.0 | 443.6 | 240 | 199.7 |
| 800.0 | 80 | 875 | 189.9 | 46.3 | 589.5 | 147.6 | 428.2 | 202 | 178.4 |
| 750.0 | 75 | 822 | 172.2 | 44.8 | 576.7 | 133.0 | 422.9 | 184 | 168.0 |
| 700.0 | 70 | 770 | 155.6 | 43.3 | 565.1 | 120.0 | 418.9 | 167 | 158.0 |
| 600.0 | 60 | 664 | 124.1 | 40.7 | 541.5 | 96.7 | 410.7 | 134 | 138.1 |
| 500.0 | 50 | 560 | 94.9 | 38.6 | 513.9 | 76.7 | 399.0 | 105 | 118.7 |
| 400.0 | 40 | 457 | 69.8 | 38.0 | 476.8 | 59.2 | 377.9 | 78 | 99.6 |
| 300.0 | 30 | 354 | 48.1 | 36.9 | 428.9 | 44.4 | 346.4 | 55 | 80.9 |
| 250.0 | 25 | 303 | 38.4 | 35.9 | 400.8 | 38.0 | 326.6 | 45 | 71.7 |
| 200.0 | 20 | 251 | 29.9 | 34.4 | 366.2 | 32.2 | 299.8 | 36 | 63.4 |
| 100.0 | 10 | 145 | 16.1 | 29.7 | 278.4 | 22.7 | 226.4 | 21 | 49.0 |

## General Performance Data (Continued)

| GENSET POWER WITH FAN | PERCENT LOAD | ENGINE POWER | WET INLET AIR VOL FLOW RATE | ENGINE OUTLET WET EXH GAS VOL FLOW RATE | WET INLET AIR MASS FLOW RATE | WET EXH GAS MASS FLOW RATE | ENGINE OUTLET WET EXH VOL FLOW RATE (0 DEG C AND 101 KPA) | ENGINE OUTLET DRY EXH VOL FLOW RATE (0 DEG C AND 101 KPA) |
|---|---|---|---|---|---|---|---|---|
| EKW | % | BKW | M3/MIN | M3/MIN | KG/HR | KG/HR | M3/MIN | M3/MIN |
| 1,000.0 | 100 | 1,089 | 74.2 | 192.9 | 5,220.1 | 5,431.5 | 71.4 | 65.1 |
| 900.0 | 90 | 981 | 69.0 | 173.9 | 4,856.7 | 5,045.8 | 66.3 | 60.5 |
| 800.0 | 80 | 875 | 62.7 | 152.1 | 4,342.5 | 4,508.6 | 59.2 | 54.2 |
| 750.0 | 75 | 822 | 59.5 | 142.4 | 4,095.1 | 4,250.4 | 55.9 | 51.1 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 700.0 | 70 | 770 | 56.4 | 133.5 | 3,864.4 | 4,009.4 | 52.7 | 48.3 |
| 600.0 | 60 | 664 | 50.3 | 116.6 | 3,423.4 | 3,549.1 | 46.6 | 42.7 |
| 500.0 | 50 | 560 | 44.5 | 100.8 | 3,008.6 | 3,116.3 | 41.0 | 37.6 |
| 400.0 | 40 | 457 | 39.2 | 85.6 | 2,637.7 | 2,727.4 | 35.9 | 33.1 |
| 300.0 | 30 | 354 | 34.5 | 71.2 | 2,311.0 | 2,382.7 | 31.4 | 29.1 |
| 250.0 | 25 | 303 | 32.3 | 64.3 | 2,163.5 | 2,226.3 | 29.3 | 27.3 |
| 200.0 | 20 | 251 | 30.5 | 57.6 | 2,035.7 | 2,089.2 | 27.5 | 25.7 |
| 100.0 | 10 | 145 | 27.5 | 45.0 | 1,834.9 | 1,868.9 | 24.6 | 23.4 |

## Heat Rejection Data

| GENSET POWER WITH FAN | PERCENT LOAD | ENGINE POWER | REJECTION TO JACKET WATER | REJECTION TO ATMOSPHERE | REJECTION TO EXH | EXH RECOVERY TO 177C | FROM OIL COOLER | FROM AFTERCOOLER | WORK ENERGY | LOW HEAT VALUE ENERGY | HIGH HEAT VALUE ENERGY |
|---|---|---|---|---|---|---|---|---|---|---|---|
| EKW | % | BKW | KW | KW | KW | KW | KW | KW | KW | KW | KW |
| 1,000.0 | 100 | 1,089 | 340 | 139 | 871 | 464 | 134 | 241 | 1,089 | 2,516 | 2,680 |
| 900.0 | 90 | 981 | 313 | 126 | 770 | 398 | 120 | 204 | 981 | 2,247 | 2,394 |
| 800.0 | 80 | 875 | 285 | 118 | 664 | 334 | 105 | 160 | 875 | 1,973 | 2,102 |
| 750.0 | 75 | 822 | 272 | 116 | 618 | 308 | 98.5 | 141 | 822 | 1,849 | 1,970 |
| 700.0 | 70 | 770 | 260 | 114 | 577 | 285 | 92.2 | 124 | 770 | 1,731 | 1,844 |
| 600.0 | 60 | 664 | 237 | 105 | 499 | 244 | 80.0 | 93.2 | 664 | 1,501 | 1,599 |
| 500.0 | 50 | 560 | 215 | 96.9 | 424 | 203 | 68.2 | 67.3 | 560 | 1,280 | 1,364 |
| 400.0 | 40 | 457 | 196 | 89.1 | 350 | 160 | 56.9 | 45.4 | 457 | 1,068 | 1,138 |
| 300.0 | 30 | 354 | 179 | 73.0 | 277 | 117 | 45.6 | 28.4 | 354 | 856 | 911 |
| 250.0 | 25 | 303 | 170 | 60.0 | 242 | 96.1 | 39.8 | 21.6 | 303 | 747 | 796 |
| 200.0 | 20 | 251 | 152 | 53.1 | 205 | 73.5 | 33.9 | 16.5 | 251 | 636 | 677 |
| 100.0 | 10 | 145 | 89.0 | 53.8 | 132 | 26.1 | 21.5 | 9.9 | 145 | 403 | 430 |

## Emissions Data

**DIESEL**

**RATED SPEED NOMINAL DATA: 1500 RPM**

| GENSET POWER WITH FAN | | EKW | 1,000.0 | 750.0 | 500.0 | 250.0 | 100.0 |
|---|---|---|---|---|---|---|---|
| PERCENT LOAD | | % | 100 | 75 | 50 | 25 | 10 |
| ENGINE POWER | | BKW | 1,089 | 822 | 560 | 303 | 145 |
| TOTAL NOX (AS NO2) | | G/HR | 8,370 | 7,777 | 6,149 | 2,916 | 1,225 |
| TOTAL CO | | G/HR | 662 | 347 | 208 | 283 | 429 |
| TOTAL HC | | G/HR | 19 | 21 | 47 | 27 | 73 |
| TOTAL CO2 | | KG/HR | 671 | 494 | 339 | 199 | 108 |
| PART MATTER | | G/HR | 38.9 | 32.4 | 33.1 | 38.0 | 20.2 |
| TOTAL NOX (AS NO2) | (CORR 5% O2) | MG/NM3 | 2,928.1 | 3,697.9 | 4,174.7 | 3,396.8 | 2,588.6 |
| TOTAL CO | (CORR 5% O2) | MG/NM3 | 229.6 | 162.9 | 140.9 | 334.7 | 1,010.1 |
| TOTAL HC | (CORR 5% O2) | MG/NM3 | 5.7 | 8.8 | 28.2 | 30.4 | 156.4 |
| PART MATTER | (CORR 5% O2) | MG/NM3 | 11.9 | 12.7 | 19.5 | 40.3 | 35.9 |
| TOTAL NOX (AS NO2) | (CORR 5% O2) | PPM | 1,426 | 1,801 | 2,033 | 1,655 | 1,261 |
| TOTAL CO | (CORR 5% O2) | PPM | 184 | 130 | 113 | 268 | 808 |
| TOTAL HC | (CORR 5% O2) | PPM | 11 | 16 | 53 | 57 | 292 |
| TOTAL NOX (AS NO2) | | G/HP-HR | 5.80 | 7.10 | 8.22 | 7.19 | 6.31 |
| TOTAL CO | | G/HP-HR | 0.46 | 0.32 | 0.28 | 0.70 | 2.21 |
| TOTAL HC | | G/HP-HR | 0.01 | 0.02 | 0.06 | 0.07 | 0.38 |
| PART MATTER | | G/HP-HR | 0.03 | 0.03 | 0.04 | 0.09 | 0.10 |
| TOTAL NOX (AS NO2) | | LB/HR | 18.45 | 17.15 | 13.56 | 6.43 | 2.70 |
| TOTAL CO | | LB/HR | 1.46 | 0.77 | 0.46 | 0.62 | 0.95 |
| TOTAL HC | | LB/HR | 0.04 | 0.05 | 0.10 | 0.06 | 0.16 |
| TOTAL CO2 | | LB/HR | 1,478 | 1,090 | 748 | 439 | 238 |
| PART MATTER | | LB/HR | 0.09 | 0.07 | 0.07 | 0.08 | 0.04 |
| OXYGEN IN EXH | | % | 9.0 | 9.7 | 10.4 | 12.4 | 15.6 |
| DRY SMOKE OPACITY | | % | 0.9 | 1.1 | 1.3 | 2.1 | 0.9 |
| BOSCH SMOKE NUMBER | | | 0.32 | 0.40 | 0.56 | 0.96 | 0.33 |

# PERFORMANCE DATA[EM0777]

September 22, 2023

### RATED SPEED POTENTIAL SITE VARIATION: 1500 RPM

| GENSET POWER WITH FAN | | EKW | 1,000.0 | 750.0 | 500.0 | 250.0 | 100.0 |
|---|---|---|---|---|---|---|---|
| PERCENT LOAD | | % | 100 | 75 | 50 | 25 | 10 |
| ENGINE POWER | | BKW | 1,089 | 822 | 560 | 303 | 145 |
| TOTAL NOX (AS NO2) | | G/HR | 10,128 | 9,411 | 7,440 | 3,528 | 1,483 |
| TOTAL CO | | G/HR | 1,237 | 650 | 389 | 529 | 803 |
| TOTAL HC | | G/HR | 36 | 39 | 88 | 50 | 138 |
| PART MATTER | | G/HR | 75.8 | 63.3 | 64.5 | 74.1 | 39.3 |
| TOTAL NOX (AS NO2) | (CORR 5% O2) | MG/NM3 | 3,543.0 | 4,474.5 | 5,051.4 | 4,110.1 | 3,132.2 |
| TOTAL CO | (CORR 5% O2) | MG/NM3 | 429.3 | 304.6 | 263.4 | 625.8 | 1,888.8 |
| TOTAL HC | (CORR 5% O2) | MG/NM3 | 10.7 | 16.6 | 53.4 | 57.5 | 295.6 |
| PART MATTER | (CORR 5% O2) | MG/NM3 | 23.2 | 24.8 | 38.0 | 78.6 | 70.0 |
| TOTAL NOX (AS NO2) | (CORR 5% O2) | PPM | 1,726 | 2,179 | 2,460 | 2,002 | 1,526 |
| TOTAL CO | (CORR 5% O2) | PPM | 343 | 244 | 211 | 501 | 1,511 |
| TOTAL HC | (CORR 5% O2) | PPM | 20 | 31 | 100 | 107 | 552 |
| TOTAL NOX (AS NO2) | | G/HP-HR | 7.02 | 8.59 | 9.94 | 8.70 | 7.64 |
| TOTAL CO | | G/HP-HR | 0.86 | 0.59 | 0.52 | 1.31 | 4.14 |
| TOTAL HC | | G/HP-HR | 0.02 | 0.04 | 0.12 | 0.12 | 0.71 |
| PART MATTER | | G/HP-HR | 0.05 | 0.06 | 0.09 | 0.18 | 0.20 |
| TOTAL NOX (AS NO2) | | LB/HR | 22.33 | 20.75 | 16.40 | 7.78 | 3.27 |
| TOTAL CO | | LB/HR | 2.73 | 1.43 | 0.86 | 1.17 | 1.77 |
| TOTAL HC | | LB/HR | 0.08 | 0.09 | 0.19 | 0.11 | 0.30 |
| PART MATTER | | LB/HR | 0.17 | 0.14 | 0.14 | 0.16 | 0.09 |

## Regulatory Information

| NON-CERTIFIED | 1970 - 2100 |
|---|---|
| THIS ENGINE RATING IS NOT EMISSIONS CERTIFIED BY ANY DOMESTIC OR FOREIGN AGENCY. | |

## Altitude Derate Data

### STANDARD

### ALTITUDE CORRECTED POWER CAPABILITY (BKW)

| AMBIENT OPERATING TEMP (C) | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | NORMAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ALTITUDE (M) | | | | | | | | | | | | | | |
| 0 | 1,089 | 1,089 | 1,089 | 1,089 | 1,089 | 1,089 | 1,089 | 1,089 | 1,089 | 1,089 | 1,089 | 1,085 | 1,050 | 1,089 |
| 250 | 1,089 | 1,089 | 1,089 | 1,089 | 1,089 | 1,089 | 1,089 | 1,089 | 1,089 | 1,089 | 1,089 | 1,069 | 1,030 | 1,089 |
| 500 | 1,089 | 1,089 | 1,089 | 1,089 | 1,089 | 1,089 | 1,089 | 1,089 | 1,089 | 1,089 | 1,076 | 1,032 | 979 | 1,089 |
| 750 | 1,089 | 1,089 | 1,089 | 1,089 | 1,089 | 1,089 | 1,089 | 1,089 | 1,089 | 1,076 | 1,043 | 990 | 924 | 1,089 |
| 1,000 | 1,089 | 1,089 | 1,089 | 1,089 | 1,089 | 1,089 | 1,089 | 1,081 | 1,064 | 1,050 | 1,011 | 960 | 897 | 1,089 |
| 1,250 | 1,089 | 1,089 | 1,089 | 1,089 | 1,089 | 1,089 | 1,075 | 1,055 | 1,036 | 1,019 | 987 | 945 | 895 | 1,089 |
| 1,500 | 1,089 | 1,089 | 1,089 | 1,089 | 1,089 | 1,074 | 1,054 | 1,036 | 1,017 | 995 | 966 | 932 | 891 | 1,089 |
| 1,750 | 1,089 | 1,089 | 1,089 | 1,084 | 1,067 | 1,050 | 1,034 | 1,025 | 1,010 | 986 | 956 | 924 | 880 | 1,086 |
| 2,000 | 1,089 | 1,089 | 1,076 | 1,056 | 1,043 | 1,029 | 1,013 | 1,006 | 991 | 968 | 945 | 915 | 868 | 1,065 |
| 2,250 | 1,089 | 1,079 | 1,044 | 1,026 | 1,015 | 1,002 | 993 | 985 | 960 | 943 | 925 | 890 | 849 | 1,040 |
| 2,500 | 1,027 | 1,019 | 1,013 | 1,005 | 993 | 980 | 969 | 951 | 928 | 890 | 853 | 786 | 715 | 1,013 |
| 2,750 | 1,022 | 1,014 | 1,008 | 1,000 | 988 | 976 | 965 | 946 | 923 | 887 | 849 | 783 | 712 | 1,010 |
| 3,000 | 1,017 | 1,009 | 1,003 | 995 | 983 | 971 | 960 | 942 | 919 | 883 | 846 | 780 | 710 | 1,007 |
| 3,250 | 1,011 | 1,004 | 998 | 990 | 978 | 966 | 955 | 937 | 915 | 879 | 842 | 777 | 708 | 1,004 |
| 3,500 | 1,006 | 999 | 993 | 985 | 973 | 961 | 950 | 933 | 910 | 875 | 838 | 774 | 705 | 1,002 |
| 3,750 | 1,001 | 993 | 987 | 980 | 968 | 956 | 946 | 928 | 906 | 870 | 834 | 770 | 702 | 999 |
| 4,000 | 995 | 988 | 982 | 975 | 963 | 951 | 941 | 923 | 901 | 866 | 830 | 767 | 699 | 996 |
| 4,250 | 990 | 983 | 977 | 970 | 958 | 946 | 936 | 919 | 897 | 862 | 826 | 763 | 696 | 998 |
| 4,500 | 985 | 977 | 972 | 965 | 953 | 941 | 931 | 914 | 892 | 857 | 822 | 760 | 693 | 998 |

## Cross Reference

| Test Spec | Setting | Engine Arrangement | Engineering Model | Engineering Model Version | Start Effective Serial Number | End Effective Serial Number |
|---|---|---|---|---|---|---|
| 4486035 | GG1049 | 4409146 | GS471 | - | JPE00001 | |
| 4486035 | GG1049 | 4409147 | GS471 | - | JPE00001 | |
| 4486035 | GG1049 | 4419371 | GS471 | - | JPE00001 | |
| 4486035 | GG1049 | 5233426 | GS471 | - | PRH00001 | |
| 4486035 | GG1049 | 5233427 | GS471 | - | PRH00001 | |
| 4486035 | GG1049 | 5233428 | GS471 | - | PRH00001 | |
| 4486035 | GG1049 | 5369856 | GS856 | - | JP500001 | |
| 4486035 | GG1049 | 5448648 | GS423 | D | JPE00001 | |
| 4486035 | GG1049 | 5612767 | GS471 | DK | JPE00001 | |
| 4486035 | GG1049 | 5998600 | PG450 | XJ | JPE00001 | |
| 6351377 | GG2974 | 5998600 | PG450 | XJ | ZRP00001 | |

## Performance Parameter Reference

**Parameters Reference:DM9600-14**

**PERFORMANCE DEFINITIONS**

PERFORMANCE DEFINITIONS DM9600
APPLICATION:
Engine performance tolerance values below are representative of a typical production engine tested in a calibrated dynamometer test cell at SAE J1995 standard reference conditions. Caterpillar maintains ISO9001:2000 certified quality management systems for engine test Facilities to assure accurate calibration of test equipment. Engine test data is corrected in accordance with SAE J1995. Additional reference material SAE J1228, J1349, ISO 8665, 3046-1:2002E, 3046-3:1989, 1585, 2534, 2288, and 9249 may apply in part or are similar to SAE J1995. Special engine rating request (SERR) test data shall be noted.
PERFORMANCE PARAMETER TOLERANCE FACTORS:
Power +/- 3%
Torque +/- 3%
Exhaust stack temperature +/- 8%
Inlet airflow +/- 5%
Intake manifold pressure-gage +/- 10%
Exhaust flow +/- 6%
Specific fuel consumption +/- 3%
Fuel rate +/- 5%
Specific DEF consumption +/- 3%
DEF rate +/- 5%
Heat rejection +/- 5%
Heat rejection exhaust only +/- 10%
Heat rejection CEM only +/- 10%
Heat Rejection values based on using treated water.
Torque is included for truck and industrial applications, do not use for Gen Set or steady state applications.
On C7 - C18 engines, at speeds of 1100 RPM and under these values are provided for reference only, and may not meet the tolerance listed.
On 3500 and C175 engines, at speeds below Peak Torque these values are provided for reference only, and may not meet the tolerance listed.
These values do not apply to C280/3600. For these models, see the tolerances listed below.
C280/3600 HEAT REJECTION TOLERANCE FACTORS:
Heat rejection +/- 10%
Heat rejection to Atmosphere +/- 50%
Heat rejection to Lube Oil +/- 20%
Heat rejection to Aftercooler +/- 5%
TEST CELL TRANSDUCER TOLERANCE FACTORS:
Torque +/- 0.5%
Speed +/- 0.2%
Fuel flow +/- 1.0%
Temperature +/- 2.0 C degrees
Intake manifold pressure +/- 0.1 kPa
OBSERVED ENGINE PERFORMANCE IS CORRECTED TO SAE J1995 REFERENCE AIR AND FUEL CONDITIONS.
REFERENCE ATMOSPHERIC INLET AIR
FOR 3500 ENGINES AND SMALLER
SAE J1228 AUG2002 for marine engines, and J1995 JAN2014 for other engines, reference atmospheric pressure is 100 KPA (29.61 in hg), and standard temperature is 25deg C (77 deg F) at 30% relative

humidity at the stated aftercooler water temp, or inlet manifold temp.

FOR 3600 ENGINES

Engine rating obtained and presented in accordance with ISO 3046/1 and SAE J1995 JANJAN2014 reference atmospheric pressure is 100 KPA (29.61 in hg), and standard temperature is 25deg C (77 deg F) at 30% relative humidity and 150M altitude at the stated aftercooler water temperature.

MEASUREMENT LOCATION FOR INLET AIR TEMPERATURE

Location for air temperature measurement air cleaner inlet at stabilized operating conditions.

REFERENCE EXHAUST STACK DIAMETER

The Reference Exhaust Stack Diameter published with this dataset is only used for the calculation of Smoke Opacity values displayed in this dataset. This value does not necessarily represent the actual stack diameter of the engine due to the variety of exhaust stack adapter options available. Consult the price list, engine order or general dimension drawings for the actual stack diameter size ordered or options available.

REFERENCE FUEL

DIESEL

Reference fuel is #2 distillate diesel with a 35API gravity; A lower heating value is 42,780 KJ/KG (18,390 BTU/LB) when used at 15 deg C (59 deg F), where the density is 850 G/Liter (7.0936 Lbs/Gal).

GAS

Reference natural gas fuel has a lower heating value of 33.74 KJ/L (905 BTU/CU Ft). Low BTU ratings are based on 18.64 KJ/L (500 BTU/CU FT) lower heating value gas. Propane ratings are based on 87.56 KJ/L (2350 BTU/CU Ft) lower heating value gas.

ENGINE POWER (NET) IS THE CORRECTED FLYWHEEL POWER (GROSS) LESS EXTERNAL AUXILIARY LOAD

Engine corrected gross output includes the power required to drive standard equipment; lube oil, scavenge lube oil, fuel transfer, common rail fuel, separate circuit aftercooler and jacket water pumps. Engine net power available for the external (flywheel) load is calculated by subtracting the sum of auxiliary load from the corrected gross flywheel out put power. Typical auxiliary loads are radiator cooling fans, hydraulic pumps, air compressors and battery charging alternators. For Tier 4 ratings additional Parasitic losses would also include Intake, and Exhaust Restrictions.

ALTITUDE CAPABILITY

Altitude capability is the maximum altitude above sea level at standard temperature and standard pressure at which the engine could develop full rated output power on the current performance data set.

Standard temperature values versus altitude could be seen on TM2001.

When viewing the altitude capability chart the ambient temperature is the inlet air temp at the compressor inlet.

Engines with ADEM MEUI and HEUI fuel systems operating at conditions above the defined altitude capability derate for atmospheric pressure and temperature conditions outside the values defined, see TM2001.

Mechanical governor controlled unit injector engines require a setting change for operation at conditions above the altitude defined on the engine performance sheet. See your Caterpillar technical representative for non standard ratings.

REGULATIONS AND PRODUCT COMPLIANCE

TMI Emissions information is presented at 'nominal' and 'Potential Site Variation' values for standard ratings. No tolerances are applied to the emissions data. These values are subject to change at any time. The controlling federal and local emission requirements need to be verified by your Caterpillar technical representative.

Customer's may have special emission site requirements that need to be verified by the Caterpillar Product Group engineer.

EMISSION CYCLE LIMITS:

Cycle emissions Max Limits apply to cycle-weighted averages only. Emissions at individual load points may exceed the cycle-weighted limit.

WET & DRY EXHAUST/EMISSIONS DESCRIPTION:

Wet - Total exhaust flow or concentration of total exhaust flow
Dry - Total exhaust flow minus water vapor or concentration of exhaust flow with water vapor excluded

EMISSIONS DEFINITIONS:

Emissions : DM1176

EMISSION CYCLE DEFINITIONS

1. For constant-speed marine engines for ship main propulsion, including,diesel-electric drive, test cycle E2 shall be applied, for controllable-pitch propeller sets test cycle E2 shall be applied.
2. For propeller-law-operated main and propeller-law-operated auxiliary engines the test cycle E3 shall be applied.
3. For constant-speed auxiliary engines test cycle D2 shall be applied.
4. For variable-speed, variable-load auxiliary engines, not

included above, test cycle C1 shall be applied.
HEAT REJECTION DEFINITIONS:
Diesel Circuit Type and HHV Balance : DM9500
HIGH DISPLACEMENT (HD) DEFINITIONS:
3500: EM1500
RATING DEFINITIONS:
Agriculture : TM6008
Fire Pump : TM6009
Generator Set : TM6035
Generator (Gas) : TM6041
Industrial Diesel : TM6010
Industrial (Gas) : TM6040
Irrigation : TM5749
Locomotive : TM6037
Marine Auxiliary : TM6036
Marine Prop (Except 3600) : TM5747
Marine Prop (3600 only) : TM5748
MSHA : TM6042
Oil Field (Petroleum) : TM6011
Off-Highway Truck : TM6039
On-Highway Truck : TM6038
SOUND DEFINITIONS:
Sound Power : DM8702
Sound Pressure : TM7080
Date Released : 10/27/21

## Substation Generator (C170D5)

# Generator set data sheet

**Model:** C170 D5
**Frequency:** 50
**Fuel type:** Diesel

| | |
|---|---|
| **Spec sheet:** | **SS28-CPGK** |
| **Noise data sheet (open/enclosed):** | **ND50-CS550** |
| **Airflow data sheet:** | **AF50-550** |
| **Derate data sheet (open/enclosed):** | **TBD** |
| **Transient data sheet:** | **TD50-550** |

## Fuel consumption

| | Standby | | | | Prime | | | |
|---|---|---|---|---|---|---|---|---|
| | **kVA (kW)** | | | | **kVA (kW)** | | | |
| **Ratings** | 170 (136) | | | | 155 (124) | | | |
| **Load** | **1/4** | **1/2** | **3/4** | **Full** | **1/4** | **1/2** | **3/4** | **Full** |
| **gph** | 4.0 | 6.1 | 8.3 | 10.5 | 3.2 | 5.3 | 8.1 | 9.5 |
| **L/hr** | 15.20 | 23.20 | 31.50 | 39.60 | 12.10 | 20.00 | 30.60 | 36.00 |

## Engine

| | **Standby rating** | **Prime rating** |
|---|---|---|
| Engine manufacturer | TCL | |
| Engine model | 6BTAA5.9-G7 | |
| Configuration | 4-cycle, In-line, 6-cylinder, | |
| Aspiration | Turbocharged and charged air cooled | |
| Gross engine power output, kWm | 160 | 145 |
| BMEP at set rated load, kPa | 2178 | 1972 |
| Bore, mm | 102 | |
| Stroke, mm | 120 | |
| Rated speed, rpm | 1500 | |
| Piston speed, m/s | 6 | |
| Compression ratio | 16.5 :1 | |
| Lube oil capacity, L | 16.4 | |
| Overspeed limit, rpm | 1800 | |
| Regenerative power, kW | NA | |
| Governor type | Electronic | |
| Starting voltage | 12V | |

## Fuel flow

| | |
|---|---|
| Maximum fuel flow, L/hr | 45 |
| Maximum fuel inlet restriction, mm Hg | 101 / 203 (clean / dirty filter) |
| Maximum fuel inlet temperature, °C | 71 |

## Air

| | Standby rating | Prime rating |
|---|---|---|
| Combustion air, $m^3$/min | 12.43 | 11.81 |
| Maximum air cleaner restriction, kPa | 4 | |

## Exhaust

| | | |
|---|---|---|
| Exhaust gas flow at set rated load, $m^3$/min | 32.37 | 31.12 |
| Exhaust gas temperature, °C | 533 | 517 |
| Maximum exhaust back pressure, kPa | 10.25 | |

## Standard set-mounted radiator cooling

| | | |
|---|---|---|
| Ambient design, °C | 50 | |
| Fan load, $kW_m$ | 9.8 | |
| Coolant capacity (with radiator), L | 22.1 | |
| Cooling system air flow, $m^3$/sec @ 12.7 mm$H_2O$ | 3.77 | |
| Total heat rejection, Btu/min | 3128 | 2900 |
| Maximum cooling air flow static restriction mm $H_2O$ | 12.7 | |

## Weights*

| | Open | Enclosed |
|---|---|---|
| Unit dry weight kgs | 1635 | 2390 |
| Unit wet weight kgs | 1650 | 2400 |

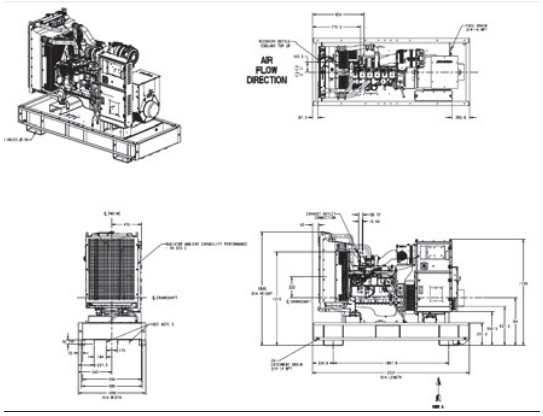
* Weights represent a set with standard features. See outline drawing for weights of other configurations.

## Dimensions

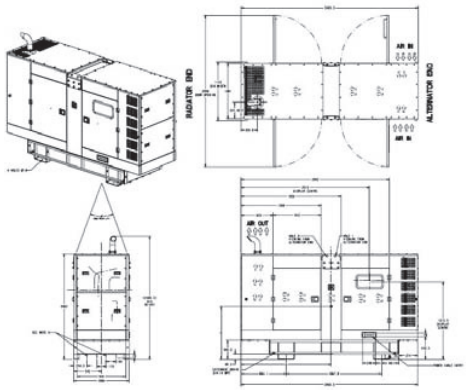
| | Length | Width | Height |
|---|---|---|---|
| Standard open set dimensions | 2537 | 1090 | 1846 |
| Standard enclosed set dimensions | 3460 | 1090 | 2387 |

## Genset outline

**Open set**




**Enclosed set**




Outlines are for illustrative purposes only. Please refer to the genset outline drawing for an exact representation of this model.

## Alternator data

| Connection[1] | Temp rise °C | Duty[2] | Alternator | Voltage |
|---|---|---|---|---|
| WYE | 163 | ESP | UCI274F | 190-208 & 380 - 416 V |
| WYE | 150 | ESP | UCI274G | 190-208 & 380 - 416 V |
| WYE | 125 | PRP | UCI274F | 190-208 & 380 - 416 V |
| WYE | 105 | PRP | UCI274G | 190-208 & 380 - 416 V |

## Ratings definitions

| Emergency standby power (ESP): | Limited-time running power (LTP): | Prime power (PRP): | Base load (continuous) power (COP): |
|---|---|---|---|
| Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514. | Applicable for supplying power to a constant electrical load for limited hours. Limited Time Running Power (LTP) is in accordance with ISO 8528. | Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514. | Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) is in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271 and BS 5514. |

## Formulas for calculating full load currents:

**Three phase output**

$$\frac{\text{kW} \times 1000}{\text{Voltage} \times 1.73 \times 0.8}$$

**Single phase output**

$$\frac{\text{kW} \times \text{SinglePhaseFactor} \times 1000}{\text{Voltage}}$$

**See your distributor for more information.**
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Power Generation

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