

|                                    |              |                                                   |                 |
|------------------------------------|--------------|---------------------------------------------------|-----------------|
| ENGINE SPEED (rpm):                | 1400         | RATING STRATEGY:                                  | STANDARD        |
| COMPRESSION RATIO:                 | 8            | APPLICATION:                                      | GAS COMPRESSION |
| AFTERCOOLER TYPE:                  | SCAC         | RATING LEVEL:                                     | CONTINUOUS      |
| AFTERCOOLER WATER INLET (°F):      | 130          | FUEL:                                             | NAT GAS         |
| JACKET WATER OUTLET (°F):          | 210          | FUEL SYSTEM:                                      | HPG IMPCO       |
| ASPIRATION:                        | TA           | FUEL PRESSURE RANGE(psig): (See note 1)           | 35.0-40.0       |
| COOLING SYSTEM:                    | JW+OC, AC    | FUEL METHANE NUMBER:                              | 80              |
| CONTROL SYSTEM:                    | EIS          | FUEL LHV (Btu/scf):                               | 905             |
| EXHAUST MANIFOLD:                  | ASWC         | ALTITUDE CAPABILITY AT 77°F INLET AIR TEMP. (ft): | 5000            |
| COMBUSTION:                        | LOW EMISSION |                                                   |                 |
| NOx EMISSION LEVEL (g/bhp-hr NOx): | 2.0          |                                                   |                 |

| RATING                         | NOTES | LOAD | 100% | 75%  | 50%  |
|--------------------------------|-------|------|------|------|------|
| ENGINE POWER (WITHOUT FAN)     | (2)   | bhp  | 1265 | 948  | 632  |
| ENGINE EFFICIENCY (ISO 3046/1) | (3)   | %    | 34.3 | 33.6 | 31.4 |
| ENGINE EFFICIENCY (NOMINAL)    | (3)   | %    | 33.7 | 33.0 | 30.8 |

| ENGINE DATA                                             |          |                      |       |      |      |  |
|---------------------------------------------------------|----------|----------------------|-------|------|------|--|
| FUEL CONSUMPTION (ISO 3046/1)                           | (4)      | Btu/bhp-hr           | 7407  | 7564 | 8098 |  |
| FUEL CONSUMPTION (NOMINAL)                              | (4)      | Btu/bhp-hr           | 7551  | 7711 | 8255 |  |
| AIR FLOW (77°F, 14.7 psia) (WET)                        | (5) (6)  | ft <sup>3</sup> /min | 2665  | 1929 | 1290 |  |
| AIR FLOW (WET)                                          | (5) (6)  | lb/hr                | 11817 | 8553 | 5721 |  |
| FUEL FLOW (60°F, 14.7 psia)                             |          | scfm                 | 176   | 135  | 96   |  |
| COMPRESSOR OUT PRESSURE                                 |          | in Hg(abs)           | 73.7  | 68.9 | 51.1 |  |
| COMPRESSOR OUT TEMPERATURE                              |          | °F                   | 307   | 278  | 201  |  |
| AFTERCOOLER AIR OUT TEMPERATURE                         |          | °F                   | 133   | 130  | 122  |  |
| INLET MAN. PRESSURE                                     | (7)      | in Hg(abs)           | 64.8  | 48.0 | 32.9 |  |
| INLET MAN. TEMPERATURE (MEASURED IN PLENUM)             | (8)      | °F                   | 141   | 140  | 135  |  |
| TIMING                                                  | (9)      | °BTDC                | 33    | 33   | 33   |  |
| EXHAUST TEMPERATURE - ENGINE OUTLET                     | (10)     | °F                   | 868   | 862  | 866  |  |
| EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia) (WET) | (11) (6) | ft <sup>3</sup> /min | 7149  | 5170 | 3484 |  |
| EXHAUST GAS MASS FLOW (WET)                             | (11) (6) | lb/hr                | 12299 | 8922 | 5984 |  |

| EMISSIONS DATA - ENGINE OUT       |              |          |      |      |      |  |
|-----------------------------------|--------------|----------|------|------|------|--|
| NOx (as NO <sub>2</sub> )         | (12)(13)     | g/bhp-hr | 2.00 | 4.60 | 8.19 |  |
| CO                                | (12)(14)     | g/bhp-hr | 1.89 | 2.18 | 2.42 |  |
| THC (mol. wt. of 15.84)           | (12)(14)     | g/bhp-hr | 2.87 | 2.37 | 2.43 |  |
| NMHC (mol. wt. of 15.84)          | (12)(14)     | g/bhp-hr | 0.43 | 0.36 | 0.36 |  |
| NMNEHC (VOCs) (mol. wt. of 15.84) | (12)(14)(15) | g/bhp-hr | 0.29 | 0.24 | 0.24 |  |
| HCHO (Formaldehyde)               | (12)(14)     | g/bhp-hr | 0.25 | 0.27 | 0.30 |  |
| CO <sub>2</sub>                   | (12)(14)     | g/bhp-hr | 490  | 500  | 536  |  |
| EXHAUST OXYGEN                    | (12)(16)     | % DRY    | 8.3  | 7.5  | 6.4  |  |
| LAMBDA                            | (12)(16)     |          | 1.55 | 1.46 | 1.37 |  |

| ENERGY BALANCE DATA                      |          |         |        |        |       |  |
|------------------------------------------|----------|---------|--------|--------|-------|--|
| LHV INPUT                                | (17)     | Btu/min | 159156 | 121895 | 87019 |  |
| HEAT REJECTION TO JACKET WATER (JW)      | (18)(25) | Btu/min | 40263  | 34216  | 28327 |  |
| HEAT REJECTION TO ATMOSPHERE             | (19)     | Btu/min | 5313   | 4428   | 3544  |  |
| HEAT REJECTION TO LUBE OIL (OC)          | (20)(25) | Btu/min | 6366   | 5410   | 4479  |  |
| HEAT REJECTION TO EXHAUST (LHV TO 77°F)  | (21)(22) | Btu/min | 44474  | 31670  | 21186 |  |
| HEAT REJECTION TO EXHAUST (LHV TO 350°F) | (21)     | Btu/min | 28646  | 20604  | 13990 |  |
| HEAT REJECTION TO AFTERCOOLER (AC)       | (23)(26) | Btu/min | 8274   | 5113   | 1824  |  |
| PUMP POWER                               | (24)     | Btu/min | 838    | 838    | 838   |  |

### CONDITIONS AND DEFINITIONS

Engine rating obtained and presented in accordance with ISO 3046/1. (Standard reference conditions of 77°F, 29.60 in Hg barometric pressure.) No overload permitted at rating shown. Consult the altitude deration factor chart for applications that exceed the rated altitude or temperature.

Emission levels are at engine exhaust flange prior to any after treatment. Values are based on engine operating at steady state conditions, adjusted to the specified NOx level at 100% load. Tolerances specified are dependent upon fuel quality. Fuel methane number cannot vary more than  $\pm 3$ . Part load data may require engine adjustment.

For notes information consult page three.

## FUEL USAGE GUIDE

| CAT METHANE NUMBER | 14   | 20   | 25   | 30   | 35   | 40   | 45 | 50 | 55 | 60 | 65 | 70 | 75 | 80 | 100 |
|--------------------|------|------|------|------|------|------|----|----|----|----|----|----|----|----|-----|
| SET POINT TIMING   | 20   | 20   | 20   | 20   | 21   | 22   | 23 | 24 | 26 | 27 | 28 | 30 | 31 | 33 | 33  |
| DERATION FACTOR    | 0.50 | 0.65 | 0.78 | 0.90 | 0.90 | 0.90 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   |

## ALTITUDE DERATION FACTORS AT RATED SPEED

| INLET AIR TEMP °F | 130 | 120 | 110 | 100 | 90 | 80 | 70 | 60 | 50 | 0    | 1000 | 2000 | 3000 | 4000 | 5000 | 6000 | 7000 | 8000 | 9000 | 10000 | 11000 | 12000 |
|-------------------|-----|-----|-----|-----|----|----|----|----|----|------|------|------|------|------|------|------|------|------|------|-------|-------|-------|
| 130               | 1   | 1   | 1   | 1   | 1  | 1  | 1  | 1  | 1  | 0.98 | 0.95 | 0.91 | 0.88 | 0.84 | 0.81 | 0.78 | 0.75 | 0.72 | 0.69 |       |       |       |
| 120               | 1   | 1   | 1   | 1   | 1  | 1  | 1  | 1  | 1  | 0.96 | 0.93 | 0.89 | 0.86 | 0.82 | 0.79 | 0.76 | 0.73 | 0.70 |      |       |       |       |
| 110               | 1   | 1   | 1   | 1   | 1  | 1  | 1  | 1  | 1  | 0.98 | 0.94 | 0.91 | 0.87 | 0.84 | 0.80 | 0.77 | 0.74 | 0.71 |      |       |       |       |
| 100               | 1   | 1   | 1   | 1   | 1  | 1  | 1  | 1  | 1  | 0.96 | 0.92 | 0.89 | 0.85 | 0.82 | 0.79 | 0.75 | 0.72 | 0.69 |      |       |       |       |
| 90                | 1   | 1   | 1   | 1   | 1  | 1  | 1  | 1  | 1  | 0.98 | 0.94 | 0.91 | 0.87 | 0.84 | 0.80 | 0.77 | 0.74 | 0.71 |      |       |       |       |
| 80                | 1   | 1   | 1   | 1   | 1  | 1  | 1  | 1  | 1  | 0.99 | 0.96 | 0.92 | 0.88 | 0.85 | 0.81 | 0.78 | 0.75 | 0.72 |      |       |       |       |
| 70                | 1   | 1   | 1   | 1   | 1  | 1  | 1  | 1  | 1  | 0.97 | 0.94 | 0.90 | 0.86 | 0.83 | 0.80 | 0.76 | 0.73 | 0.70 |      |       |       |       |
| 60                | 1   | 1   | 1   | 1   | 1  | 1  | 1  | 1  | 1  | 0.99 | 0.95 | 0.92 | 0.88 | 0.85 | 0.81 | 0.78 | 0.75 | 0.72 |      |       |       |       |
| 50                | 1   | 1   | 1   | 1   | 1  | 1  | 1  | 1  | 1  | 0.97 | 0.94 | 0.90 | 0.86 | 0.83 | 0.80 | 0.76 | 0.73 | 0.70 |      |       |       |       |

ALTITUDE (FEET ABOVE SEA LEVEL)

## AFTERCOOLER HEAT REJECTION FACTORS (ACHRF)

| INLET AIR TEMP °F | 130  | 120  | 110  | 100  | 90   | 80   | 70   | 60   | 50   | 0    | 1000 | 2000 | 3000 | 4000 | 5000 | 6000 | 7000 | 8000 | 9000 | 10000 | 11000 | 12000 |
|-------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|-------|-------|
| 130               | 1.40 | 1.47 | 1.53 | 1.60 | 1.67 | 1.74 | 1.74 | 1.74 | 1.74 | 1.40 | 1.47 | 1.53 | 1.60 | 1.67 | 1.74 | 1.74 | 1.74 | 1.74 | 1.74 | 1.74  | 1.74  | 1.74  |
| 120               | 1.32 | 1.38 | 1.45 | 1.52 | 1.58 | 1.65 | 1.65 | 1.65 | 1.65 | 1.32 | 1.38 | 1.45 | 1.52 | 1.58 | 1.65 | 1.65 | 1.65 | 1.65 | 1.65 | 1.65  | 1.65  | 1.65  |
| 110               | 1.24 | 1.30 | 1.37 | 1.43 | 1.50 | 1.57 | 1.57 | 1.57 | 1.57 | 1.24 | 1.30 | 1.37 | 1.43 | 1.50 | 1.57 | 1.57 | 1.57 | 1.57 | 1.57 | 1.57  | 1.57  | 1.57  |
| 100               | 1.16 | 1.22 | 1.28 | 1.35 | 1.41 | 1.48 | 1.48 | 1.48 | 1.48 | 1.16 | 1.22 | 1.28 | 1.35 | 1.41 | 1.48 | 1.48 | 1.48 | 1.48 | 1.48 | 1.48  | 1.48  | 1.48  |
| 90                | 1.08 | 1.14 | 1.20 | 1.26 | 1.33 | 1.39 | 1.39 | 1.39 | 1.39 | 1.08 | 1.14 | 1.20 | 1.26 | 1.33 | 1.39 | 1.39 | 1.39 | 1.39 | 1.39 | 1.39  | 1.39  | 1.39  |
| 80                | 1    | 1.05 | 1.12 | 1.18 | 1.24 | 1.31 | 1.31 | 1.31 | 1.31 | 1    | 1.05 | 1.12 | 1.18 | 1.24 | 1.31 | 1.31 | 1.31 | 1.31 | 1.31 | 1.31  | 1.31  | 1.31  |
| 70                | 1    | 1    | 1.03 | 1.09 | 1.16 | 1.22 | 1.22 | 1.22 | 1.22 | 1    | 1    | 1.03 | 1.09 | 1.16 | 1.22 | 1.22 | 1.22 | 1.22 | 1.22 | 1.22  | 1.22  | 1.22  |
| 60                | 1    | 1    | 1    | 1.01 | 1.07 | 1.13 | 1.13 | 1.13 | 1.13 | 1    | 1    | 1    | 1.01 | 1.07 | 1.13 | 1.13 | 1.13 | 1.13 | 1.13 | 1.13  | 1.13  | 1.13  |
| 50                | 1    | 1    | 1    | 1    | 1    | 1.04 | 1.04 | 1.04 | 1.04 | 1    | 1    | 1    | 1    | 1    | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04  | 1.04  | 1.04  |

ALTITUDE (FEET ABOVE SEA LEVEL)

## MINIMUM SPEED CAPABILITY AT THE RATED SPEED'S SITE TORQUE (RPM)

| INLET AIR TEMP °F | 130  | 120  | 110  | 100  | 90   | 80   | 70   | 60   | 50   | 0    | 1000 | 2000 | 3000 | 4000 | 5000 | 6000 | 7000 | 8000 | 9000 | 10000 | 11000 | 12000 |
|-------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|-------|-------|
| 130               | 1080 | 1130 | 1190 | 1300 | 1300 | 1300 | 1300 | 1300 | 1300 | 1080 | 1130 | 1190 | 1300 | 1300 | 1300 | 1300 | 1300 | 1300 | 1300 | 1300  | 1300  | 1300  |
| 120               | 1060 | 1110 | 1160 | 1300 | 1300 | 1300 | 1300 | 1300 | 1300 | 1060 | 1110 | 1160 | 1300 | 1300 | 1300 | 1300 | 1300 | 1300 | 1300 | 1300  | 1300  | 1300  |
| 110               | 1030 | 1080 | 1140 | 1190 | 1300 | 1300 | 1300 | 1300 | 1300 | 1030 | 1080 | 1140 | 1190 | 1300 | 1300 | 1300 | 1300 | 1300 | 1300 | 1300  | 1300  | 1300  |
| 100               | 1010 | 1060 | 1110 | 1170 | 1300 | 1300 | 1300 | 1300 | 1300 | 1010 | 1060 | 1110 | 1170 | 1300 | 1300 | 1300 | 1300 | 1300 | 1300 | 1300  | 1300  | 1300  |
| 90                | 1000 | 1040 | 1090 | 1140 | 1190 | 1300 | 1300 | 1300 | 1300 | 1000 | 1040 | 1090 | 1140 | 1190 | 1300 | 1300 | 1300 | 1300 | 1300 | 1300  | 1300  | 1300  |
| 80                | 1000 | 1010 | 1060 | 1110 | 1170 | 1300 | 1300 | 1300 | 1300 | 1000 | 1010 | 1060 | 1110 | 1170 | 1300 | 1300 | 1300 | 1300 | 1300 | 1300  | 1300  | 1300  |
| 70                | 1000 | 1000 | 1040 | 1090 | 1140 | 1200 | 1300 | 1300 | 1300 | 1000 | 1000 | 1040 | 1090 | 1140 | 1200 | 1300 | 1300 | 1300 | 1300 | 1300  | 1300  | 1300  |
| 60                | 1000 | 1000 | 1010 | 1060 | 1110 | 1170 | 1300 | 1300 | 1300 | 1000 | 1000 | 1010 | 1060 | 1110 | 1170 | 1300 | 1300 | 1300 | 1300 | 1300  | 1300  | 1300  |
| 50                | 1000 | 1000 | 1000 | 1040 | 1090 | 1140 | 1200 | 1300 | 1300 | 1000 | 1000 | 1000 | 1040 | 1090 | 1140 | 1200 | 1300 | 1300 | 1300 | 1300  | 1300  | 1300  |

ALTITUDE (FEET ABOVE SEA LEVEL)

**FUEL USAGE GUIDE:**

This table shows the derate factor and full load set point timing required for a given fuel. Note that deration and set point timing adjustment may be required as the methane number decreases. Methane number is a scale to measure detonation characteristics of various fuels. The methane number of a fuel is determined by using the Caterpillar methane number calculation.

**ALTITUDE DERATION FACTORS:**

This table shows the deration required for various air inlet temperatures and altitudes. Use this information along with the fuel usage guide chart to help determine actual engine power for your site. The derate factors shown do not take into account external cooling system capacity. The derate factors provided assume the external cooling system can maintain the specified cooling water temperatures, at site conditions.

**ACTUAL ENGINE RATING:**

To determine the actual rating of the engine at site conditions, one must consider separately, limitations due to fuel characteristics and air system limitations. The Fuel Usage Guide deration establishes fuel limitations. The Altitude/Temperature deration factors and RPC (reference the Caterpillar Methane Program) establish air system limitations. RPC comes into play when the Altitude/Temperature deration is less than 1.0 (100%). Under this condition, add the two factors together. When the site conditions do not require an Altitude/Temperature derate (factor is 1.0), it is assumed the turbocharger has sufficient capability to overcome the low fuel relative power, and RPC is ignored. To determine the actual power available, take the lowest rating between 1) and 2).

- 1) Fuel Usage Guide Deration
- 2)  $1 - ((1 - \text{Altitude/Temperature Deration}) + (1 - \text{RPC}))$

**AFTERCOOLER HEAT REJECTION FACTORS(ACHRF):**

To maintain a constant air inlet manifold temperature, as the inlet air temperature goes up, so must the heat rejection. As altitude increases, the turbocharger must work harder to overcome the lower atmospheric pressure. This increases the amount of heat that must be removed from the inlet air by the aftercooler. Use the aftercooler heat rejection factor (ACHRF) to adjust for inlet air temp and altitude conditions. See note 26 for application of this factor in calculating the heat exchanger sizing criteria. Failure to properly account for these factors could result in detonation and cause the engine to shutdown or fail.

**MINIMUM SPEED CAPABILITY AT THE RATED SPEED'S SITE TORQUE (RPM):**

This table shows the minimum allowable engine turndown speed where the engine will maintain the Rated Speed's Torque for the given ambient conditions.

**NOTES:**

1. Fuel pressure range specified is to the engine fuel pressure regulator. Additional fuel train components should be considered in pressure and flow calculations.
2. Engine rating is with two engine driven water pumps. Tolerance is  $\pm 3\%$  of full load.
3. ISO 3046/1 engine efficiency tolerance is  $(+0, -)5\%$  of full load % efficiency value. Nominal engine efficiency tolerance is  $\pm 3.0\%$  of full load % efficiency value.
4. ISO 3046/1 fuel consumption tolerance is  $(+5, -)0\%$  of full load data. Nominal fuel consumption tolerance is  $\pm 3.0\%$  of full load data.
5. Air flow value is on a 'wet' basis. Flow is a nominal value with a tolerance of  $\pm 5\%$ .
6. Inlet and Exhaust Restrictions must not exceed A&I limits based on full load flow rates from the standard technical data sheet.
7. Inlet manifold pressure is a nominal value with a tolerance of  $\pm 5\%$ .
8. Inlet manifold temperature is a nominal value with a tolerance of  $\pm 9^\circ\text{F}$ .
9. Timing indicated is for use with the minimum fuel methane number specified. Consult the appropriate fuel usage guide for timing at other methane numbers.
10. Exhaust temperature is a nominal value with a tolerance of  $(+63^\circ\text{F}, -)54^\circ\text{F}$ .
11. Exhaust flow value is on a 'wet' basis. Flow is a nominal value with a tolerance of  $\pm 6\%$ .
12. Emissions data is at engine exhaust flange prior to any after treatment.
13. NOx values are set points and will vary with operating conditions.
14. CO, CO<sub>2</sub>, THC, NMHC, NMNEHC, and HCHO values are "Not to Exceed" levels. THC, NMHC, and NMNEHC do not include aldehydes.
15. VOCs - Volatile organic compounds as defined in US EPA 40 CFR 60, subpart JJJJ
16. Exhaust Oxygen tolerance is  $\pm 0.5$ ; Lambda tolerance is  $\pm 0.05$ . Lambda and Exhaust Oxygen level are the result of adjusting the engine to operate at the specified NOx level.
17. LHV rate tolerance is  $\pm 3.0\%$ .
18. Heat rejection to jacket water value displayed includes heat to jacket water alone. Value is based on treated water. Tolerance is  $\pm 10\%$  of full load data.
19. Heat rejection to atmosphere based on treated water. Tolerance is  $\pm 50\%$  of full load data.
20. Lube oil heat rate based on treated water. Tolerance is  $\pm 20\%$  of full load data.
21. Exhaust heat rate based on treated water. Tolerance is  $\pm 10\%$  of full load data.
22. Heat rejection to exhaust (LHV to  $77^\circ\text{F}$ ) value shown includes unburned fuel and is not intended to be used for sizing or recovery calculations.
23. Heat rejection to aftercooler based on treated water. Tolerance is  $\pm 5\%$  of full load data.
24. Pump power includes engine driven jacket water and aftercooler water pumps. Engine brake power includes effects of pump power.
25. Total Jacket Water Circuit heat rejection is calculated as:  $(\text{JW} \times 1.1) + (\text{OC} \times 1.2)$ . Heat exchanger sizing criterion is maximum circuit heat rejection at site conditions, with applied tolerances. A cooling system safety factor may be multiplied by the total circuit heat rejection to provide additional margin.
26. Total Aftercooler Circuit heat rejection is calculated as:  $\text{AC} \times \text{ACHRF} \times 1.05$ . Heat exchanger sizing criterion is maximum circuit heat rejection at site conditions, with applied tolerances. A cooling system safety factor may be multiplied by the total circuit heat rejection to provide additional margin.

ENGINE POWER (bhp): 1265  
 ENGINE SPEED (rpm): 1400  
 EXHAUST MANIFOLD: ASWC

COOLING SYSTEM:  
 AFTERCOOLER WATER INLET (°F):  
 JACKET WATER OUTLET (°F):

JW+OC, AC  
 130  
 210

### Free Field Mechanical and Exhaust Noise

| SOUND PRESSURE LEVEL (dB)           |                               |      |       |       |        |        |        |       |       |       |       |
|-------------------------------------|-------------------------------|------|-------|-------|--------|--------|--------|-------|-------|-------|-------|
| Octave Band Center Frequency (OBCF) |                               |      |       |       |        |        |        |       |       |       |       |
| 100% Load Data                      |                               |      | dB(A) | 63 Hz | 125 Hz | 250 Hz | 500 Hz | 1 kHz | 2 kHz | 4 kHz | 8 kHz |
| Mechanical Sound                    | Distance from the Engine (ft) | 3.3  | 98.1  | 93.8  | 95.3   | 91.5   | 90     | 93.1  | 92.8  | 88.8  | 83.2  |
|                                     |                               | 23.0 | 88.5  | 84.2  | 85.7   | 81.9   | 80.4   | 83.5  | 83.2  | 79.2  | 73.6  |
|                                     |                               | 49.2 | 83.2  | 78.9  | 80.4   | 76.6   | 75.1   | 78.2  | 77.9  | 73.9  | 68.3  |
| Exhaust Sound                       | Distance from the Engine (ft) | 3.3  | 113.5 | 102.9 | 105.5  | 109.5  | 105.6  | 106.9 | 106.6 | 107.1 | 104   |
|                                     |                               | 23.0 | 100.1 | 88.1  | 94.6   | 94.9   | 91.6   | 94.3  | 93.2  | 93.8  | 89.1  |
|                                     |                               | 49.2 | 93.5  | 81.5  | 87.9   | 88.2   | 84.9   | 87.6  | 86.6  | 87.2  | 82.5  |

#### SOUND PARAMETER DEFINITION:

Data Variability Statement:

Sound data presented by Caterpillar has been measured in accordance with ISO 6798 in a Grade 3 test environment. Measurements made in accordance with ISO 6798 will result in some amount of uncertainty. The uncertainties depend not only on the accuracies with which sound pressure levels and measurement surface areas are determined, but also on the 'near-field error' which increases for smaller measurement distances and lower frequencies. The uncertainty for a Grade 3 test environment, that has a source that produces sounds that are uniformly distributed in frequency over the frequency range of interest, is equal to 4 dB (A-weighted). This uncertainty is expressed as the largest value of the standard deviation.