

**General**

|                       |                  |                        |
|-----------------------|------------------|------------------------|
| Cylinders             | 4                |                        |
| Cylinder arrangement  | In line          |                        |
| Bore                  | 101 mm           | 4.0 in.                |
| Stroke                | 126 mm           | 5.0 in.                |
| Cylinder Displacement | 1.01 liter       | 61.6 in. <sup>3</sup>  |
| Total displacement    | 4.04 liter       | 246.5 in. <sup>3</sup> |
| Compression ratio     | 18.4:1           |                        |
| Combustion system     | Direct injection |                        |
| Aspiration            | Turbocharged     |                        |

**Fuel system**

|                                     |                       |                          |
|-------------------------------------|-----------------------|--------------------------|
| Lift pump suction head, max         | 1.5 m                 | 59.1 in.                 |
| Lift pump flow @max rpm             | 600 l/h               | 2.6 GPM                  |
| Max restriction in fuel supply line | 200 mbar              | 80 in. H <sub>2</sub> O  |
| Max restriction in fuel return line | 500 mbar              | 200 in. H <sub>2</sub> O |
| Max restriction in fuel pre-filter  | 200 mbar              | 80 in. H <sub>2</sub> O  |
| Fuel filter type                    | Replaceable cartridge |                          |
| Fuel consumption @ max rating       | 21.6 l/h              | 5.7 GPH                  |
| Fuel consumption @ peak torque      | 15.1 l/h              | 4.0 GPH                  |

**Combustion air system**

|                                  |                         |                         |
|----------------------------------|-------------------------|-------------------------|
| Combustion air flow @ max rating | 439.2 m <sup>3</sup> /h | 258.5 CFM               |
| Max allowable clean restriction  | 50 mbar                 | 20 in. H <sub>2</sub> O |
| Max allowable dirty restriction  | 60 mbar                 | 24 in. H <sub>2</sub> O |

**Exhaust system**

|                               |                        |                         |
|-------------------------------|------------------------|-------------------------|
| Exhaust gas flow @ max rating | 1194 m <sup>3</sup> /h | 702.7 CFM               |
| Exhaust temp @ max rating     | 560 °C                 | 1040 °F                 |
| Max allowable back pressure   | 75 mbar                | 30 in. H <sub>2</sub> O |

**Cooling system**

|   |                            |          |
|---|----------------------------|----------|
| Type                                    | External radiator          |          |
| Coolant flow rate @ max rpm             | 180.0 l/min                | 47.6 GPM |
| Coolant heat rejection % of gross power | 73%                        |          |
| Max coolant temp @ engine outlet        | 110 °C                     | 230 °F   |
| Max coolant operating pressure          | 1.5 bar                    | 21.8 psi |
| Coolant volume in engine                | 5.6 liter                  | 5.9 qt.  |
| Coolant volume, cooler & pipes, min     | 0.06 l/kW, 0.05 qt/hp      |          |
| Expansion tank capacity, min            | 30% of circ.coolant volume |          |

**Lubrication system**

|                                 |                         |           |
|---------------------------------|-------------------------|-----------|
| Lubrication type                | Forced feed lubrication |           |
| Oil flow at max rpm             | 49.5 l/min              | 13.1 GPM  |
| Oil pump relief valve setting   | 6 bar                   | 87 psi    |
| Max oil temperature in oil sump | 130 °C                  | 266 °F    |
| Filter volume                   | 1.0 liter               | 1.057 qt. |
| Oil change interval             | 500 hours               |           |

**Electrical**

|                                |             |            |
|--------------------------------|-------------|------------|
| Starter motor                  | 12V, 3.1 kW | 24V, 4.0kW |
| Max battery CCA                | 1300A       | 750A       |
| Voltage drop, battery (+), max | 1.0V        |            |

**Physical data**

|                        |        |             |
|------------------------|--------|-------------|
| Length                 | 775 mm | 30.5 in.    |
| Width                  | 540 mm | 21.3 in.    |
| Height                 | 742 mm | 29.2 in.    |
| Weight, dry            | 330 kg | 726 lb.     |
| Max bending @ housing: | 800 Nm | 589.6 lb-ft |
| Max force @ flywheel:  |        |             |
| Axial:                 | N      | 0 lb.       |
| Radial:                | 5000 N | 1126.1 lb.  |

**Performance data**

|                |         |             |
|----------------|---------|-------------|
| Peak torque    | 388 Nm  | 286.0 lb-ft |
| @ rpm          | 1500    |             |
| low idle speed | 800 rpm |             |

**Gross power**

|                  |             |             |             |             |             |
|------------------|-------------|-------------|-------------|-------------|-------------|
| Engine RPM       | <b>1500</b> | <b>2100</b> | <b>2200</b> | <b>2300</b> | <b>2500</b> |
| kW, intermittent | 60.9        | 73.0        | 74.9        | 74.9        | 74.9        |
| Hp, intermittent | 81.6        | 97.8        | 100.4       | 100.4       | 100.4       |
| kW, continuous   | 52.3        | 62.0        | 64.0        | 66.0        | 70.0        |
| Hp, continuous   | 70.1        | 83.1        | 85.8        | 88.4        | 93.8        |

**Fuel consumption**

|         |       |       |       |       |       |
|---------|-------|-------|-------|-------|-------|
| g/kWhr  | 211   | 225   | 234   | 239   | 245   |
| lb/hphr | 0.346 | 0.369 | 0.384 | 0.392 | 0.402 |

**Combustion air @ 25 C**

|                   |     |     |     |     |     |
|-------------------|-----|-----|-----|-----|-----|
| m <sup>3</sup> /h | 241 | 367 | 389 | 403 | 439 |
| CFM               | 142 | 216 | 229 | 237 | 258 |

**Exhaust gas @ 500 C**

|                   |     |      |      |      |      |
|-------------------|-----|------|------|------|------|
| m <sup>3</sup> /h | 680 | 1004 | 1058 | 1098 | 1194 |
| CFM               | 400 | 591  | 623  | 646  | 703  |

**Coolant**

|       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|
| l/min | 109.0 | 151.0 | 158.0 | 166.0 | 180.0 |
| GPM   | 28.8  | 39.9  | 41.7  | 43.9  | 47.6  |

**Heat rejection to coolant**

|         |      |      |      |      |      |
|---------|------|------|------|------|------|
| kW      | 41.1 | 49.3 | 51.7 | 53.0 | 55.2 |
| BTU/min | 2338 | 2804 | 2941 | 3015 | 3140 |

**Noise, dB(A)**

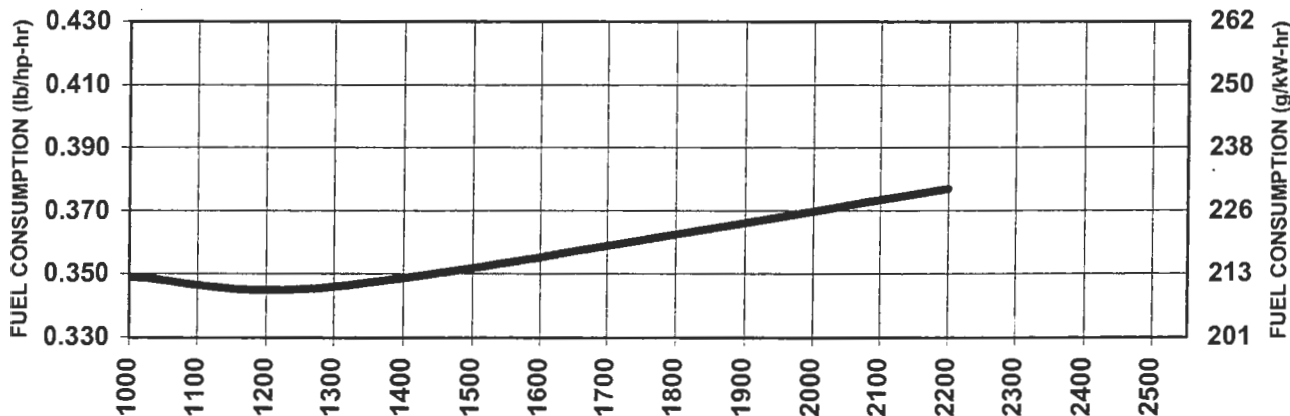
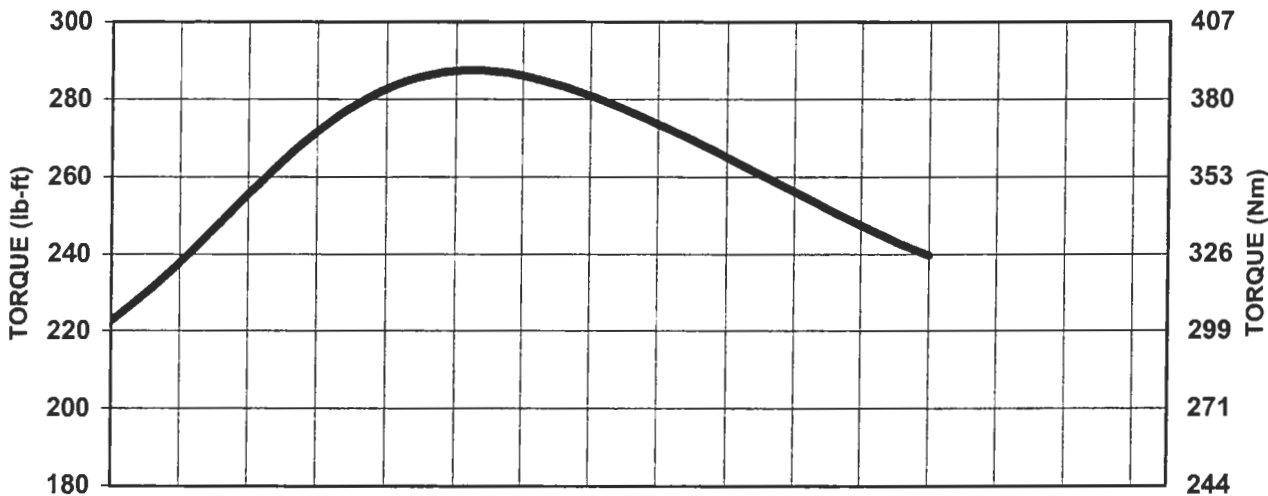
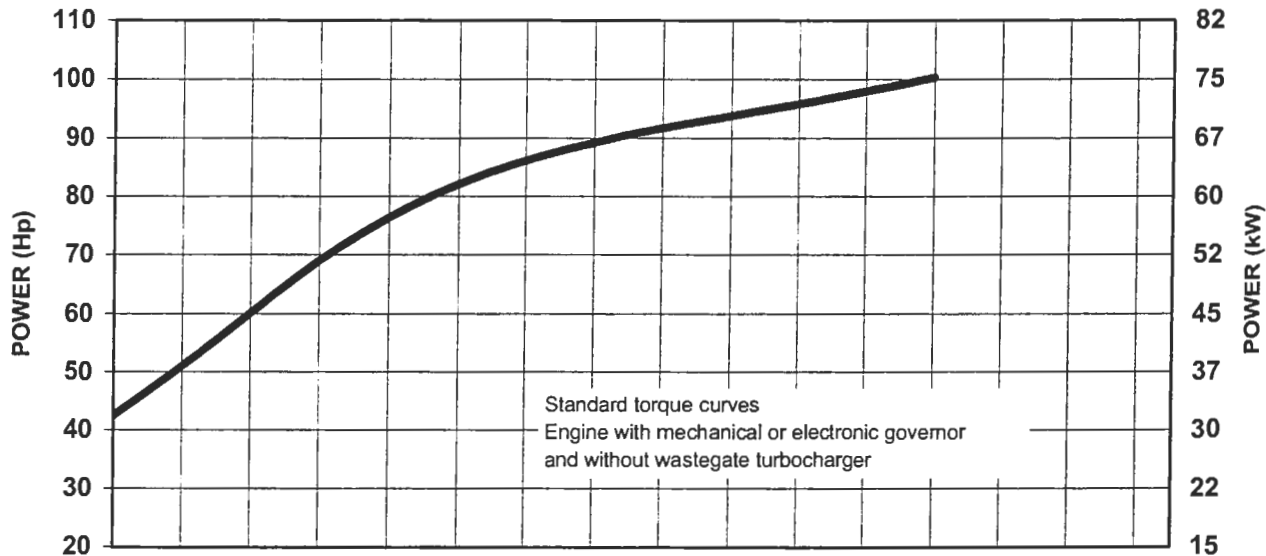
Avg. @ 1 meter

**Certifications**

U. S. EPA Non-road Tier 1  
 European COM 1  
 U. S. EPA Non-road Tier 2, effective Jan 2003  
 European COM 2, effective Jan 2003

# ENGINE PERFORMANCE CURVES

|                          |                         |
|--------------------------|-------------------------|
| ENGINE MODEL             | BF4M2012                |
| RATING STANDARD          | ISO 3046                |
| RATED INTERMITTENT POWER | 100.4 Hp at 2200 rpm    |
| MAX. TORQUE              | 287.4 lb-ft at 1500 rpm |
| EMISSION CERTIFICATION   | COM 2 (EPA Tier 2 *)    |



Tolerance: +/- 5% per ISO 3046

Reference conditions: 25 °C (77 °F) 99 kPa (29.31 in. Hg)

Fuel: 40 °C (104 °F) 0.850 kg/l (7.07 lb/gal)

Curves are based on current data and are subject to change without notice.

Document: 999-7120\_F\_2200

Date: 08 Aug 2001

Name: Oldham

## General

|                       |                  |                        |
|-----------------------|------------------|------------------------|
| Cylinders             | 6                |                        |
| Cylinder arrangement  | In line          |                        |
| Bore                  | 101 mm           | 4.0 in.                |
| Stroke                | 126 mm           | 5.0 in.                |
| Cylinder Displacement | 1.01 liter       | 61.6 in. <sup>3</sup>  |
| Total displacement    | 6.06 liter       | 369.7 in. <sup>3</sup> |
| Compression ratio     | 18.4:1           |                        |
| Combustion system     | Direct injection |                        |
| Aspiration            | Turbocharged     |                        |

## Fuel system

|                                     |                       |                          |
|-------------------------------------|-----------------------|--------------------------|
| Lift pump suction head, max         | 1.5 m                 | 59.1 in.                 |
| Lift pump flow @max rpm             | 600 l/h               | 2.6 GPM                  |
| Max restriction in fuel supply line | 200 mbar              | 80 in. H <sub>2</sub> O  |
| Max restriction in fuel return line | 500 mbar              | 200 in. H <sub>2</sub> O |
| Max restriction in fuel pre-filter  | 200 mbar              | 80 in. H <sub>2</sub> O  |
| Fuel filter type                    | Replaceable cartridge |                          |
| Fuel consumption @ max rating       | 42.3 l/h              | 11.2 GPH                 |
| Fuel consumption @ peak torque      | 28.0 l/h              | 7.4 GPH                  |

## Combustion air system

|                                  |                         |                         |
|----------------------------------|-------------------------|-------------------------|
| Combustion air flow @ max rating | 920.7 m <sup>3</sup> /h | 541.8 CFM               |
| Max allowable clean restriction  | 50 mbar                 | 20 in. H <sub>2</sub> O |
| Max allowable dirty restriction  | 65 mbar                 | 26 in. H <sub>2</sub> O |
| Charge air press. @ max rating   | 1.5 bar                 | 21.8 psi                |
| Turbo outlet temp. @ max rating  | 169 °C                  | 336.2 °F                |
| Temp. after charge air cooler    | 50 °C                   | 122.0 °F                |
| Charge air heat % of gross power | 23 %                    |                         |

## Exhaust system

|                               |                          |                         |
|-------------------------------|--------------------------|-------------------------|
| Exhaust gas flow @ max rating | 2566.0 m <sup>3</sup> /h | 1510.1 CFM              |
| Exhaust temp @ max rating     | 465 °C                   | 869 °F                  |
| Max allowable back pressure   | 75 mbar                  | 30 in. H <sub>2</sub> O |

## Cooling system

|                                      |                             |          |
|--------------------------------------|-----------------------------|----------|
| Type                                 | External radiator           |          |
| Coolant flow rate @ max rpm          | 190.0 l/min                 | 50.2 GPM |
| Coolant heat reject.% of gross power | 51 %                        |          |
| Max coolant temp @ engine outlet     | 110 °C                      | 230 °F   |
| Max coolant operating pressure       | 1.5 bar                     | 21.8 psi |
| Coolant volume in engine             | 7.6 liter                   | 8.0 qt.  |
| Coolant volume, cooler & pipes, min  | 0.06 l/kW, 0.05 qt/hp       |          |
| Expansion tank capacity, min         | 30% of circ. Coolant volume |          |

## Lubrication system

|                                 |                         |          |
|---------------------------------|-------------------------|----------|
| Lubrication type                | Forced feed lubrication |          |
| Oil flow at max rpm             | 74.3 l/min              | 19.6 GPM |
| Oil pump relief valve setting   | 6 bar                   | 87 psi   |
| Max oil temperature in oil sump | 130 °C                  | 266 °F   |
| Filter volume                   | 1 liter                 | 1.1 qt.  |
| Oil change interval             | 500 hours               |          |

## Electrical

|                                |            |            |
|--------------------------------|------------|------------|
| Starter motor                  | 12V, 3.1kW | 24V, 4.0kW |
| Max battery CCA                | 1300A      | 750A       |
| Voltage drop, battery (+), max | 1.0V       |            |

## Physical data

|                        |         |             |
|------------------------|---------|-------------|
| Length                 | 1137 mm | 44.8 in.    |
| Width                  | 580 mm  | 22.8 in.    |
| Height                 | 906 mm  | 35.7 in.    |
| Weight, dry            | 495 kg  | 1089 lb.    |
| Max bending @ housing: | 800 Nm  | 589.6 lb-ft |
| Max force @ flywheel:  |         |             |
| Axial:                 | N       | 0 lb.       |
| Radial:                | 5000 N  | 1126.1 lb.  |

## Performance data

|                |         |             |
|----------------|---------|-------------|
| Peak torque    | 743 Nm  | 547.6 lb-ft |
| @ rpm          | 1500    |             |
| low idle speed | 800 rpm |             |

## Gross power

| Engine RPM       | 1500  | 2100  | 2200  | 2300  | 2500  |
|------------------|-------|-------|-------|-------|-------|
| kW, intermittent | 116.7 | 138.0 | 143.0 | 147.0 | 155.0 |
| Hp, intermittent | 158.7 | 187.7 | 194.5 | 199.9 | 210.8 |
|                  |       |       |       |       |       |
| kW, continuous   | 105.0 | 118.0 | 121.0 | 125.0 | 132.0 |
| Hp, continuous   | 143.0 | 160.5 | 164.6 | 170.0 | 179.5 |

## Fuel consumption

|         | 202   | 215   | 219   | 223   | 232   |
|---------|-------|-------|-------|-------|-------|
| g/kWhr  |       |       |       |       |       |
| lb/hphr | 0.331 | 0.353 | 0.359 | 0.366 | 0.380 |

## Combustion air

|                   | 539 | 721 | 776 | 819 | 921 |
|-------------------|-----|-----|-----|-----|-----|
| m <sup>3</sup> /h |     |     |     |     |     |
| CFM               | 317 | 424 | 457 | 482 | 542 |

## Exhaust gas

|                   | 1261 | 2120 | 2232 | 2348 | 2566 |
|-------------------|------|------|------|------|------|
| m <sup>3</sup> /h |      |      |      |      |      |
| CFM               | 742  | 1248 | 1314 | 1382 | 1510 |

## Coolant

|       | 113  | 160  | 167  | 175  | 190  |
|-------|------|------|------|------|------|
| l/min |      |      |      |      |      |
| GPM   | 29.7 | 42.3 | 44.1 | 46.2 | 50.2 |

## Heat rejection to coolant

|         | 58.35 | 69.4 | 71.9 | 74.2 | 79.4 |
|---------|-------|------|------|------|------|
| kW      |       |      |      |      |      |
| BTU/min | 3319  | 3947 | 4090 | 4220 | 4516 |

## Heat rejection to charge air

|         | 19.1 | 22.7 | 26.0 | 29.4 | 36   |
|---------|------|------|------|------|------|
| kW      |      |      |      |      |      |
| BTU/min | 1086 | 1291 | 1479 | 1672 | 2048 |

## Noise, dB(A)

Avg. @ 1 meter

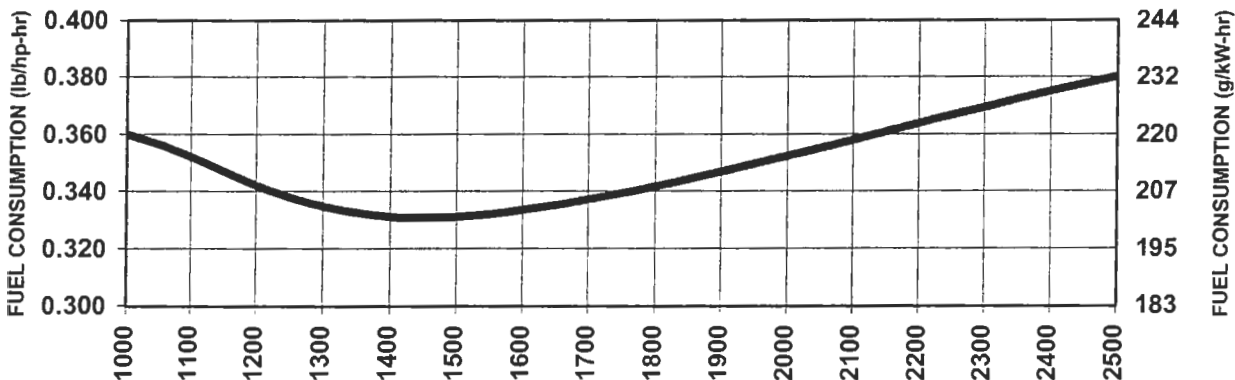
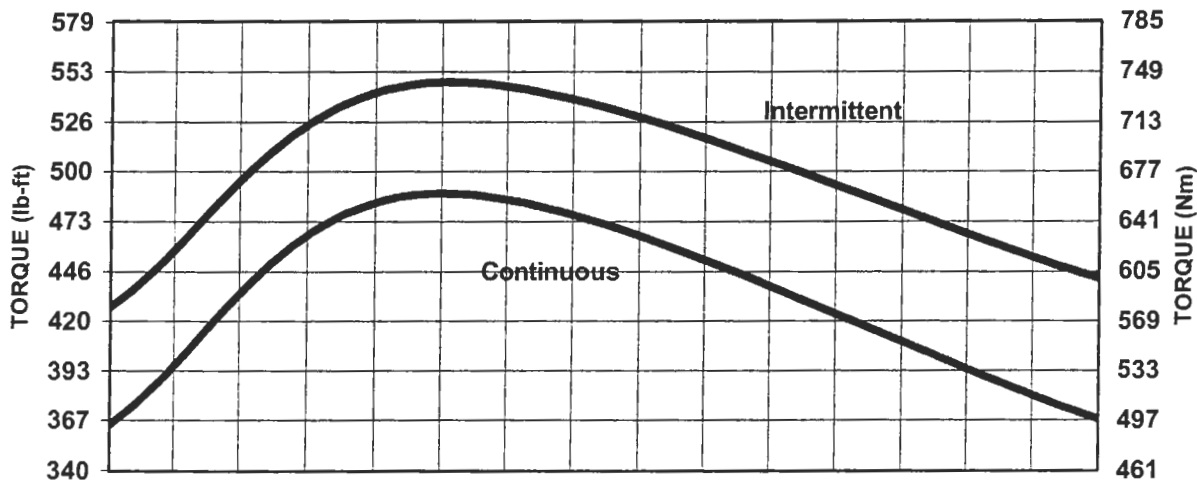
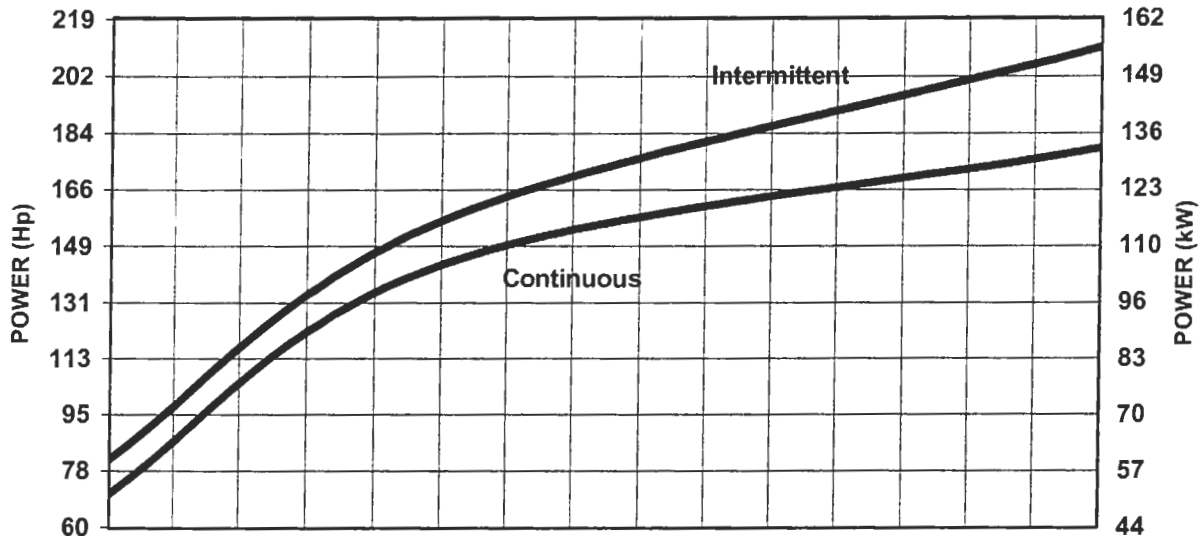
## Certifications

U. S. EPA Non-road Tier 1  
 European COM 1  
 U. S. EPA Non-road Tier 2, effective Jan 2003  
 European COM 2, effective Jan 2003

# ENGINE PERFORMANCE CURVES

ENGINE MODEL  
 RATING STANDARD  
 RATED INTERMITTENT POWER  
 MAX. TORQUE  
 EMISSION CERTIFICATION

BF6M2012C  
 ISO 3046  
 210.8 Hp at 2500 rpm  
 547.6 lb-ft at 1500 rpm  
 EPA Tier 2 / COM 2



Tolerance: +/- 5% per ISO 3046  
 Reference conditions: 25 °C (77 °F) 99 kPa (29.31 in. Hg)  
 Fuel: 40 °C (104 °F) 0.850 kg/l (7.07 lb/gal)

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 Name: Reda Fam