



calculatoratoz.com



unitsconverters.com

Diesel Engine Power Plant Formulas

Calculators!

Examples!

Conversions!

Bookmark calculatoratoz.com, unitsconverters.com

Widest Coverage of Calculators and Growing - **30,000+ Calculators!**
Calculate With a Different Unit for Each Variable - **In built Unit Conversion!**
Widest Collection of Measurements and Units - **250+ Measurements!**

Feel free to SHARE this document with your friends!

[Please leave your feedback here...](#)



List of 28 Diesel Engine Power Plant Formulas

Diesel Engine Power Plant

1) Area of Piston given Piston Bore

$$\text{fx } A = \left(\frac{\pi}{4}\right) \cdot B^2$$

[Open Calculator !\[\]\(a870788d6ed9b8fd294b7654a8c8526b_img.jpg\)](#)

$$\text{ex } 0.16619\text{m}^2 = \left(\frac{\pi}{4}\right) \cdot (460\text{mm})^2$$

2) Brake Mean Effective Pressure

$$\text{fx } \text{BMEP} = \eta_m \cdot \text{IMEP}$$

[Open Calculator !\[\]\(c50c8b7b2cc2cf9ff925edec0ee94c0d_img.jpg\)](#)

$$\text{ex } 4.7645\text{Bar} = 0.733 \cdot 6.5\text{Bar}$$

3) Brake Mean Effective Pressure given Torque

$$\text{fx } \text{BMEP} = K \cdot \tau$$

[Open Calculator !\[\]\(f60b7a900783ac3fd531bfd9c111be6d_img.jpg\)](#)

$$\text{ex } 4.75839\text{Bar} = 31.5 \cdot 15.106\text{kN}\cdot\text{m}$$



4) Brake Power using Break Mean Effective Pressure

$$\text{fx } P_{4b} = \frac{\text{BMEP} \cdot A \cdot L \cdot \left(\frac{N}{2}\right) \cdot N_c}{60}$$

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235_img.jpg\)](#)

$$\text{ex } 5531.12\text{kW} = \frac{4.76\text{Bar} \cdot 0.166\text{m}^2 \cdot 600\text{mm} \cdot \left(\frac{7000\text{rad/s}}{2}\right) \cdot 2}{60}$$

5) Brake Specific Fuel Consumption given Brake Power and Fuel Consumption Rate

$$\text{fx } \text{BSFC} = \frac{m_f}{P_{4b}}$$

[Open Calculator !\[\]\(3e2231b1ad3ca8da8658228c00dd08e0_img.jpg\)](#)

$$\text{ex } 0.230811\text{kg/h/kW} = \frac{0.355\text{kg/s}}{5537\text{kW}}$$


6) Brake Thermal Efficiency of Diesel Engine Power Plant

$$\text{fx } \text{BTE} = \frac{P_{4b}}{m_f \cdot \text{CV}}$$

[Open Calculator !\[\]\(0d5ec72f61334709c3fc9450209b754f_img.jpg\)](#)

$$\text{ex } 0.371362 = \frac{5537\text{kW}}{0.355\text{kg/s} \cdot 42000\text{kJ/kg}}$$



7) Break Power given Bore and Stroke 

$$fx \quad P_{4b} = \frac{\eta_m \cdot IMEP \cdot A \cdot L \cdot \left(\frac{N}{2}\right) \cdot N_c}{60}$$

Open Calculator 


$$ex \quad 5536.349kW = \frac{0.733 \cdot 6.5Bar \cdot 0.166m^2 \cdot 600mm \cdot \left(\frac{7000rad/s}{2}\right) \cdot 2}{60}$$

8) Break Power given Mechanical Efficiency and Indicated Power 

$$fx \quad P_{4b} = \eta_m \cdot P_{4i}$$

Open Calculator 


$$ex \quad 5536.349kW = 0.733 \cdot 7553kW$$

9) Break Power of 2 Stroke Diesel Engine 

$$fx \quad P_{2b} = \frac{2 \cdot \pi \cdot \tau \cdot N}{60}$$

Open Calculator 

$$ex \quad 11073.28kW = \frac{2 \cdot \pi \cdot 15.106kN \cdot m \cdot 7000rad/s}{60}$$

10) Break Power of 4 Stroke Diesel Engine 

$$fx \quad P_{4b} = \frac{2 \cdot \pi \cdot \tau \cdot \left(\frac{N}{2}\right)}{60}$$

Open Calculator 

$$ex \quad 5536.638kW = \frac{2 \cdot \pi \cdot 15.106kN \cdot m \cdot \left(\frac{7000rad/s}{2}\right)}{60}$$



11) Friction Power of Diesel Engine

$$fx \quad P_f = P_{4i} - P_{4b}$$

[Open Calculator !\[\]\(e2376d476d06eb31946dc01a69a4403a_img.jpg\)](#)

$$ex \quad 2016kW = 7553kW - 5537kW$$

12) Indicated Power of 2 Stroke Engine

$$fx \quad P_{i2} = \frac{IMEP \cdot A \cdot L \cdot N \cdot N_c}{60}$$

[Open Calculator !\[\]\(0b5e7e25e8775f7e7e80906ada4f0021_img.jpg\)](#)

$$ex \quad 15106kW = \frac{6.5Bar \cdot 0.166m^2 \cdot 600mm \cdot 7000rad/s \cdot 2}{60}$$

13) Indicated Power of 4 Stroke Engine

$$fx \quad P_{4i} = \frac{IMEP \cdot A \cdot L \cdot \left(\frac{N}{2}\right) \cdot N_c}{60}$$

[Open Calculator !\[\]\(bd3b31712ad9bab5a241210fa6925cdd_img.jpg\)](#)

$$ex \quad 7553kW = \frac{6.5Bar \cdot 0.166m^2 \cdot 600mm \cdot \left(\frac{7000rad/s}{2}\right) \cdot 2}{60}$$

14) Indicated Power using Brake Power and Friction Power

$$fx \quad P_{4i} = P_{4b} + P_f$$

[Open Calculator !\[\]\(7bc43b319a082987e20f7bf78f4bab80_img.jpg\)](#)

$$ex \quad 7553kW = 5537kW + 2016kW$$



15) Mechanical Efficiency of Diesel Engine

$$\text{fx } \eta_m = \frac{P_{4b}}{P_{4i}}$$

[Open Calculator !\[\]\(d3fb9f94af8b26d1c844efa9a98805b0_img.jpg\)](#)

$$\text{ex } 0.733086 = \frac{5537\text{kW}}{7553\text{kW}}$$

16) Mechanical Efficiency using Break Power and Friction Power

$$\text{fx } \eta_m = \frac{P_{4b}}{P_{4b} + P_f}$$

[Open Calculator !\[\]\(e1d6102fe77919492c04879c8450f1f5_img.jpg\)](#)

$$\text{ex } 0.733086 = \frac{5537\text{kW}}{5537\text{kW} + 2016\text{kW}}$$

17) Mechanical Efficiency using Indicated Power and Friction Power

$$\text{fx } \eta_m = \frac{P_{4i} - P_f}{P_{4i}}$$

[Open Calculator !\[\]\(ab4e2b3fc7e7887b7a72f548aa6f5e60_img.jpg\)](#)

$$\text{ex } 0.733086 = \frac{7553\text{kW} - 2016\text{kW}}{7553\text{kW}}$$

18) Overall Efficiency of Diesel Engine Power Plant

$$\text{fx } \text{BTE} = \text{ITE} \cdot \eta_m$$

[Open Calculator !\[\]\(5abce1a84a655b073239ab33e1199487_img.jpg\)](#)

$$\text{ex } 0.3665 = 0.5 \cdot 0.733$$



19) Overall Efficiency or Brake Thermal Efficiency using Brake Mean Effective Pressure

$$\text{fx } \text{BTE} = \frac{\text{BMEP} \cdot A \cdot L \cdot \left(\frac{N}{2}\right) \cdot N_c}{m_f \cdot \text{CV} \cdot 60}$$

[Open Calculator !\[\]\(9dfdaff1d86ba3c1f8353b4d1b61b8c5_img.jpg\)](#)

$$\text{ex } 0.370967 = \frac{4.76\text{Bar} \cdot 0.166\text{m}^2 \cdot 600\text{mm} \cdot \left(\frac{7000\text{rad/s}}{2}\right) \cdot 2}{0.355\text{kg/s} \cdot 42000\text{kJ/kg} \cdot 60}$$

20) Overall Efficiency or Brake Thermal Efficiency using Friction Power and Indicated Power

$$\text{fx } \text{BTE} = \frac{P_{4i} - P_f}{m_f \cdot \text{CV}}$$

[Open Calculator !\[\]\(2b376d1a92330ab09dad2665d2f89bf5_img.jpg\)](#)

$$\text{ex } 0.371362 = \frac{7553\text{kW} - 2016\text{kW}}{0.355\text{kg/s} \cdot 42000\text{kJ/kg}}$$

21) Overall Efficiency or Brake Thermal Efficiency using Mechanical Efficiency

$$\text{fx } \text{BTE} = \frac{\eta_m \cdot P_{4i}}{m_f \cdot \text{CV}}$$

[Open Calculator !\[\]\(c444627dab9fee9a1550c053ffaaaae2_img.jpg\)](#)

$$\text{ex } 0.371318 = \frac{0.733 \cdot 7553\text{kW}}{0.355\text{kg/s} \cdot 42000\text{kJ/kg}}$$



22) Thermal Efficiency of Diesel Engine Power Plant

$$fx \quad ITE = \frac{BTE}{\eta_m}$$

[Open Calculator !\[\]\(6605b201d6f14d9b3bcb8ab5f274d107_img.jpg\)](#)

$$ex \quad 0.504775 = \frac{0.37}{0.733}$$

23) Thermal Efficiency using Friction Power

$$fx \quad ITE = BTE \cdot \left(\frac{P_f + P_{4b}}{P_{4b}} \right)$$

[Open Calculator !\[\]\(e8fb589d58dad1692debababa5e928b6_img.jpg\)](#)

$$ex \quad 0.504716 = 0.37 \cdot \left(\frac{2016kW + 5537kW}{5537kW} \right)$$

24) Thermal Efficiency using Indicated Mean Effective Pressure and Break Mean Effective Pressure

$$fx \quad ITE = BTE \cdot \frac{IMEP}{BMEP}$$

[Open Calculator !\[\]\(4688aadfd656ded00cd6bdfae55089a9_img.jpg\)](#)

$$ex \quad 0.505252 = 0.37 \cdot \frac{6.5Bar}{4.76Bar}$$

25) Thermal Efficiency using Indicated Power and Brake Power

$$fx \quad ITE = BTE \cdot \frac{P_{4i}}{P_{4b}}$$

[Open Calculator !\[\]\(4146d17f71dced09c6ad789cacceaa6d_img.jpg\)](#)

$$ex \quad 0.504716 = 0.37 \cdot \frac{7553kW}{5537kW}$$



26) Thermal Efficiency using Indicated Power and Fuel Consumption Rate



$$fx \quad ITE = \frac{P_{4i}}{m_f \cdot CV}$$

Open Calculator

$$ex \quad 0.506573 = \frac{7553kW}{0.355kg/s \cdot 42000kJ/kg}$$

27) Volumetric Efficiency of Diesel Engine Power Plant

$$fx \quad VE = \frac{V}{V_c}$$

Open Calculator

$$ex \quad 0.78 = \frac{1.794m^3}{2.3m^3}$$

28) Work Done per Cycle

$$fx \quad W = IMEP \cdot A \cdot L$$

Open Calculator

$$ex \quad 64.74KJ = 6.5Bar \cdot 0.166m^2 \cdot 600mm$$



Variables Used












- **A** Piston Area (*Square Meter*)
- **B** Piston Bore (*Millimeter*)
- **BMEP** Brake Mean Effective Pressure (*Bar*)
- **BSFC** Brake Specific Fuel Consumption (*Kilogram per Hour per Kilowatt*)
- **BTE** Brake Thermal Efficiency
- **CV** Calorific Value (*Kilojoule per Kilogram*)
- **IMEP** Indicated Mean Effective Pressure (*Bar*)
- **ITE** Indicated Thermal Efficiency
- **K** Proportionality Constant
- **L** Stroke of Piston (*Millimeter*)
- **m_f** Fuel Consumption Rate (*Kilogram per Second*)
- **N** RPM (*Radian per Second*)
- **N_c** Number of Cylinders
- **P_{2b}** Brake Power of 2 Stroke (*Kilowatt*)
- **P_{4b}** Brake Power of 4 Stroke (*Kilowatt*)
- **P_{4i}** Indicated Power of 4 Stroke (*Kilowatt*)
- **P_f** Friction Power (*Kilowatt*)
- **P_{i2}** Indicated Power of 2 Stroke Engine (*Kilowatt*)
- **V** Volume of Air Induced (*Cubic Meter*)
- **V_c** Volume of Cylinder (*Cubic Meter*)
- **VE** Volumetric Efficiency
- **W** Work (*Kilojoule*)



- η_m Mechanical Efficiency
- T Torque (Kilonewton Meter)





Constants, Functions, Measurements used

- **Constant:** **pi**, 3.14159265358979323846264338327950288
Archimedes' constant
- **Measurement:** **Length** in Millimeter (mm)
Length Unit Conversion 
- **Measurement:** **Volume** in Cubic Meter (m³)
Volume Unit Conversion 
- **Measurement:** **Area** in Square Meter (m²)
Area Unit Conversion 
- **Measurement:** **Pressure** in Bar (Bar)
Pressure Unit Conversion 
- **Measurement:** **Energy** in Kilojoule (KJ)
Energy Unit Conversion 
- **Measurement:** **Power** in Kilowatt (kW)
Power Unit Conversion 
- **Measurement:** **Heat of Combustion (per Mass)** in Kilojoule per Kilogram (kJ/kg)
Heat of Combustion (per Mass) Unit Conversion 
- **Measurement:** **Mass Flow Rate** in Kilogram per Second (kg/s)
Mass Flow Rate Unit Conversion 
- **Measurement:** **Angular Velocity** in Radian per Second (rad/s)
Angular Velocity Unit Conversion 
- **Measurement:** **Torque** in Kilonewton Meter (kN*m)
Torque Unit Conversion 
- **Measurement:** **Specific Fuel Consumption** in Kilogram per Hour per Kilowatt (kg/h/kW)
Specific Fuel Consumption Unit Conversion 



Check other formula lists

- [Diesel Engine Power Plant Formulas](#) 
- [Hydroelectric Power Plant Formulas](#) 
- [Power Plant Operational Factors Formulas](#) 
- [Thermal Power Plant Formulas](#) 

Feel free to SHARE this document with your friends!

PDF Available in

[English](#) [Spanish](#) [French](#) [German](#) [Russian](#) [Italian](#) [Portuguese](#) [Polish](#) [Dutch](#)

8/16/2023 | 12:44:50 PM UTC

[Please leave your feedback here...](#)

