



Diesel Engine Power Plant Formulas

Calculators!

Examples!

Conversions!

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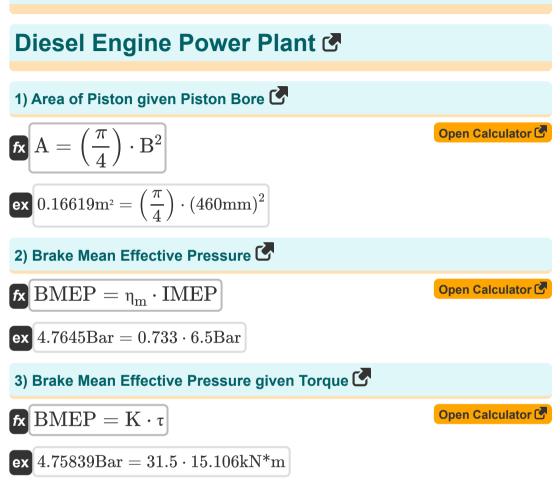
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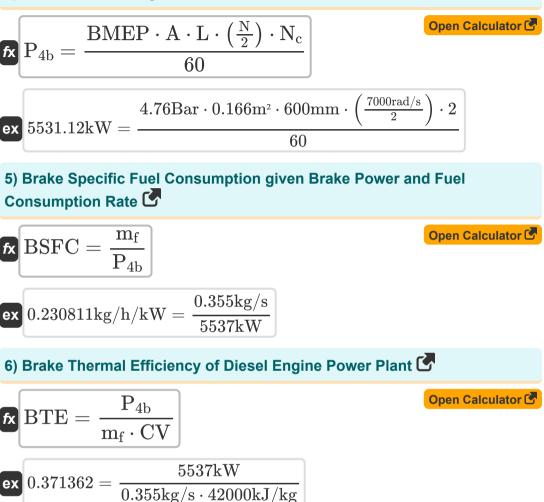
List of 28 Diesel Engine Power Plant Formulas





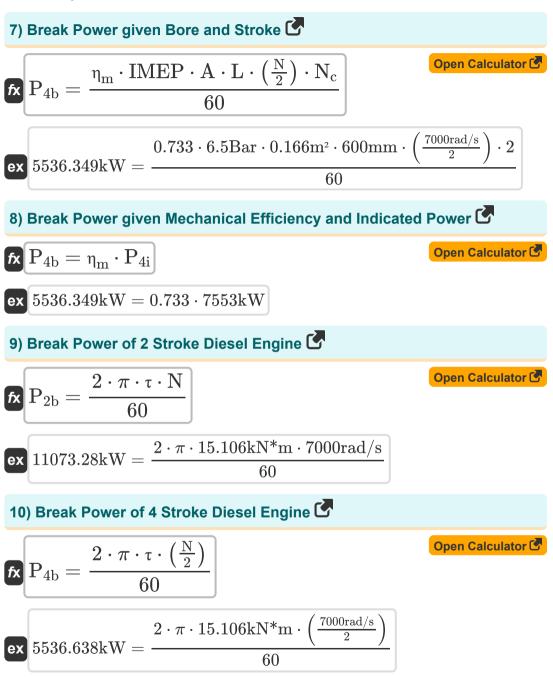


4) Brake Power using Break Mean Effective Pressure 🕑

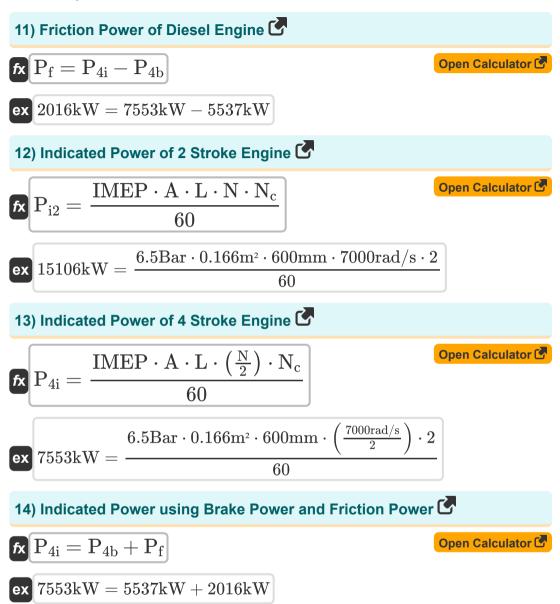








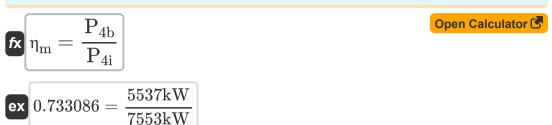




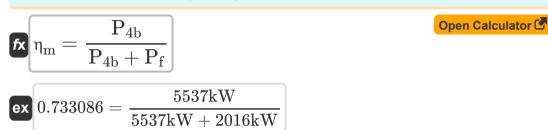


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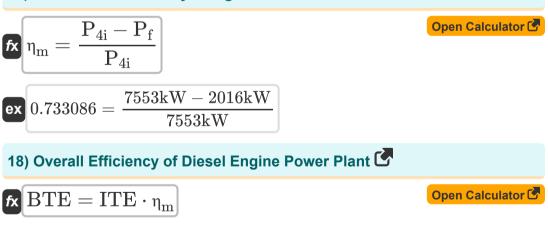
15) Mechanical Efficiency of Diesel Engine 💪



16) Mechanical Efficiency using Break Power and Friction Power



17) Mechanical Efficiency using Indicated Power and Friction Power 🕑



ex
$$0.3665 = 0.5 \cdot 0.733$$



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

$$\label{eq:BTE} \texttt{MEP} \cdot \mathbf{A} \cdot \mathbf{L} \cdot \left(\frac{\mathbf{N}}{2}\right) \cdot \mathbf{N}_{c}$$

$$\texttt{BTE} = \frac{\texttt{BMEP} \cdot \mathbf{A} \cdot \mathbf{L} \cdot \left(\frac{\mathbf{N}}{2}\right) \cdot \mathbf{N}_{c}}{\mathbf{m}_{f} \cdot \mathbf{CV} \cdot \mathbf{60}}$$

$$\texttt{Open Calculator C}$$

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

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

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

fx
$$BTE = rac{\eta_{
m m} \cdot P_{
m 4i}}{m_{
m f} \cdot CV}$$

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

Open Calculator

Open Calculator



22) Thermal Efficiency of Diesel Engine Power Plant 子

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

$$ex 0.504775 = \frac{0.37}{0.733}$$
23) Thermal Efficiency using Friction Power C
$$fx ITE = BTE \cdot \left(\frac{P_f + P_{4b}}{P_{4b}}\right)$$
Open Calculator C

ex
$$0.504716 = 0.37 \cdot \left(rac{2016 \mathrm{kW} + 5537 \mathrm{kW}}{5537 \mathrm{kW}}
ight)$$

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

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

$$\mathbf{x} \ 0.505252 = 0.37 \cdot \frac{6.5 \mathrm{Bar}}{4.76 \mathrm{Bar}}$$

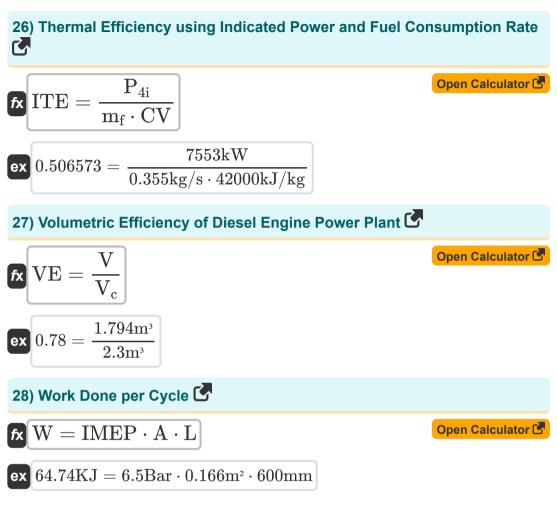
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25) Thermal Efficiency using Indicated Power and Brake Power

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

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

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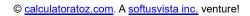


Variables Used

- 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)
- P4b Brake Power of 4 Stroke (Kilowatt)
- P4i Indicated Power of 4 Stroke (Kilowatt)
- Pf Friction Power (Kilowatt)
- Pi2 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 🗹





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