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Power Plant Operational Factors Formulas

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List of 15 Power Plant Operational Factors Formulas

Power Plant Operational Factors

1) Average Load

Open Calculator

fx $$\text{Avg Load} = \text{Max Demand} \cdot \text{Load Factor}$$

ex $$1105\text{kW} = 1700\text{kW} \cdot 0.65$$

2) Average Load for Load Curve

Open Calculator

fx $$\text{Avg Load} = \frac{A_L}{24}$$

ex $$1105.5\text{kW} = \frac{7.37\text{kW*h}}{24}$$

3) Coincidence Factor

Open Calculator

fx $$\text{CIF} = \frac{1}{\text{Diversity Factor}}$$

ex $$0.70922 = \frac{1}{1.41}$$

4) Demand Factor

Open Calculator

$$\text{Demand Factor} = \frac{\text{Max Demand}}{\text{Connected Load}}$$

$$0.472222 = \frac{1700\text{kW}}{3600\text{kW}}$$

5) Diversity Factor

Open Calculator

$$\text{Diversity Factor} = \frac{\text{S}}{\text{Max Demand}}$$

$$1.411765 = \frac{2400\text{kW}}{1700\text{kW}}$$

6) Load Factor given Average Load and Maximum Demand

Open Calculator

$$\text{Load Factor} = \frac{\text{Avg Load}}{\text{Max Demand}}$$

$$0.65 = \frac{1105\text{kW}}{1700\text{kW}}$$

7) Maximum Demand given Load Factor

Open Calculator

$$\text{Max Demand} = \frac{\text{Avg Load}}{\text{Load Factor}}$$

$$1700\text{kW} = \frac{1105\text{kW}}{0.65}$$

8) Maximum Demand using Demand Factor

Open Calculator

$$\text{Max Demand} = \text{Demand Factor} \cdot \text{Connected Load}$$

ex $1692\text{kW} = 0.47 \cdot 3600\text{kW}$

9) Operation Factor

Open Calculator

$$\text{OF} = \frac{\text{T}}{\text{T}_\text{t}}$$

ex $0.6 = \frac{6\text{h}}{10\text{h}}$

10) Plant Capacity Factor

Open Calculator

$$\text{Capacity Factor} = \frac{\text{Avg Demand}}{\text{Plant Capacity}}$$

ex $0.438261 = \frac{1260\text{kW}}{2875\text{kW}}$

11) Plant Use Factor

Open Calculator

$$\text{Plant Factor} = \frac{\text{Max Demand}}{\text{Plant Capacity}}$$

ex $0.591304 = \frac{1700\text{kW}}{2875\text{kW}}$

12) Reserve Capacity

Open Calculator

$$\text{Reserve Capacity} = \text{Plant Capacity} - \text{Max Demand}$$

ex $1175\text{kW} = 2875\text{kW} - 1700\text{kW}$

13) Unit Generated per Annum

Open Calculator

$$P_g = \text{Max Demand} \cdot \text{Load Factor} \cdot 8760$$

ex $2688.833\text{kW*h} = 1700\text{kW} \cdot 0.65 \cdot 8760$

14) Utilisation Factor of Plant

Open Calculator

$$UF = \frac{\text{Max Demand}}{\text{Plant Capacity}}$$

ex $0.591304 = \frac{1700\text{kW}}{2875\text{kW}}$

15) Wind Power

Open Calculator

$$P_{wind} = 0.5 \cdot \%\eta \cdot \rho_{air} \cdot A_{blade} \cdot V_{wind}^3$$

ex $170170.9\text{kW} = 0.5 \cdot 75 \cdot 1.225\text{kg/m}^3 \cdot 50\text{m}^2 \cdot (42\text{m/s})^3$

Variables Used

- **%η** Plant Efficiency
- **A_{blade}** Blade Area *(Square Meter)*
- **A_L** Load Curve Area *(Kilowatt-Hour)*
- **Avg Demand** Average Demand *(Kilowatt)*
- **Avg Load** Average Load *(Kilowatt)*
- **Capacity Factor** Capacity Factor
- **CIF** Coincidence Factor
- **Connected Load** Connected Load *(Kilowatt)*
- **Demand Factor** Demand Factor
- **Diversity Factor** Diversity Factor
- **Load Factor** Load Factor
- **Max Demand** Maximum Demand *(Kilowatt)*
- **OF** Operation Factor
- **P_g** Units Generated *(Kilowatt-Hour)*
- **P_{wind}** Wind Power *(Kilowatt)*
- **Plant Capacity** Plant Capacity *(Kilowatt)*
- **Plant Factor** Plant Use Factor
- **Reserve Capacity** Reserve Capacity *(Kilowatt)*
- **S** Combined Demand *(Kilowatt)*
- **T** Working Time *(Hour)*
- **T_t** Total Time *(Hour)*
- **UF** Utilisation Factor
- **V_{wind}** Wind Speed *(Meter per Second)*

- ρ_{air} Air Density *(Kilogram per Cubic Meter)*

Constants, Functions, Measurements used

- Measurement: **Time** in Hour (h)
  Time Unit Conversion
- Measurement: **Area** in Square Meter (m^2)
  Area Unit Conversion
- Measurement: **Speed** in Meter per Second (m/s)
  Speed Unit Conversion
- Measurement: **Energy** in Kilowatt-Hour (kW*h)
  Energy Unit Conversion
- Measurement: **Power** in Kilowatt (kW)
  Power Unit Conversion
- Measurement: **Density** in Kilogram per Cubic Meter (kg/m^3)
  Density Unit Conversion

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