Important Power Plant Operational Factors Formulas PDF

Formulas
Examples
with Units

List of 15
Important Power Plant Operational Factors Formulas

1) Average Load Formula

Evaluate Formula

Formula

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

Example with Units

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

2) Average Load for Load Curve Formula

Evaluate Formula

Formula

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

Example with Units

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

3) Coincidence Factor Formula

Evaluate Formula

Formula

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

Example

$$0.7092 = \frac{1}{1.41}$$

4) Demand Factor Formula

Evaluate Formula

Formula

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

Example with Units

$$0.4722 = \frac{1700\,\text{kW}}{3600\,\text{kW}}$$

5) Diversity Factor Formula

Evaluate Formula

Formula

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

Example with Units

$$1.4118 = \frac{2400\,\text{kW}}{1700\,\text{kW}}$$

6) Load Factor given Average Load and Maximum Demand Formula

Evaluate Formula

Formula

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

Example with Units

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

7) Maximum Demand given Load Factor Formula

Evaluate Formula

Formula

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

Example with Units

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

8) Maximum Demand using Demand Factor Formula

Evaluate Formula

Formula

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

Example with Units

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

9) Operation Factor Formula

Evaluate Formula

Formula

$$OF = \frac{T}{T_t}$$

Example with Units

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

10) Plant Capacity Factor Formula

Evaluate Formula

Formula

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

Example with Units

$$0.4383 = \frac{1260\,\text{kW}}{2875\,\text{kW}}$$

11) Plant Use Factor Formula

Evaluate Formula

Formula

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

Example with Units

$$0.5913 = \frac{1700\,\text{kW}}{2875\,\text{kW}}$$

12) Reserve Capacity Formula

Evaluate Formula

Formula

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

Example with Units

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

13) Unit Generated per Annum Formula

Evaluate Formula

Formula

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

Example with Units

$$2688.8333\,\text{kW*h} = 1700\,\text{kW} \cdot 0.65 \cdot 8760$$

14) Utilisation Factor of Plant Formula

Evaluate Formula

Formula

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

Example with Units

$$0.5913 = \frac{1700\,\text{kW}}{2875\,\text{kW}}$$

15) Wind Power Formula

Evaluate Formula

Formula

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

Example with Units

$$170170.875\,\text{kW} = 0.5 \cdot 75 \cdot 1.225\,\text{kg/m}^3 \cdot 50\,\text{m}^2 \cdot 42\,\text{m/s}^{3}$$

Variables used in list of Power Plant Operational Factors Formulas above

- **%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 in list of Power Plant Operational Factors Formulas above

- 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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