

Losses and efficiency

No-load losses (iron losses, P_0)

signify the effective power absorbed when nominal voltage is applied to the connections of a winding at nominal frequency while the other windings remain unloaded. No-load losses are independent of load.

Short-circuit losses (copper losses, load losses, P_k)

signify the effective power absorbed at nominal frequency when the nominal current is flowing over the line terminals of a winding while the connections of the other winding are short-circuited. Short-circuit losses rise with the square of load.

Efficiency

The efficiency of the transformer is determined for any load with:

$$\eta = 100\% - \frac{P_0 + a^2 \cdot P_k}{a \cdot S_r \cdot \cos\varphi + P_0} \cdot 100\%$$

P_0 in W

P_k in W

S in VA

S_r in VA

$$a = \frac{S}{S_r}$$