

If x is the fraction of the full load, the transformer efficiency at this fraction is given by the relation shown below

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$$\eta_x = \frac{x \text{ X output}}{x \text{ X output} + P_i + x^2 P_c} = \frac{x V_2 I_2 \cos \phi_2}{x V_2 I_2 \cos \phi_2 + P_i + x^2 I_2^2 R_{es}}$$

The copper losses vary according to the fraction of the load.

Maximum Efficiency Condition of a