2.4   No load current

The phasor sum of the magnetizing current (Im) and the loss component of current (Il); Im is calculated using the MMF/m required for the core and yoke and their respective length of flux path. Il is determined using the iron loss curve of the material used for the core and yoke and the flux density employed and their weight.

The no-load current I0 is the vectorial sum of the magnetizing current Im and core loss or working component current Ic. [Function of Im is to produce flux φm in the magnetic circuit and the function of Ic is to satisfy the no load losses of the transformer].

Thus, No load input to the transformer = $V_1 I_0 Cos \varphi_0 = V_1 Ic$ = No load losses as the output is zero and input = output + losses.

Since the copper loss under no load condition is almost negligible, the no load losses can entirely be taken as due to core loss only. Thus the core loss component of the no load current
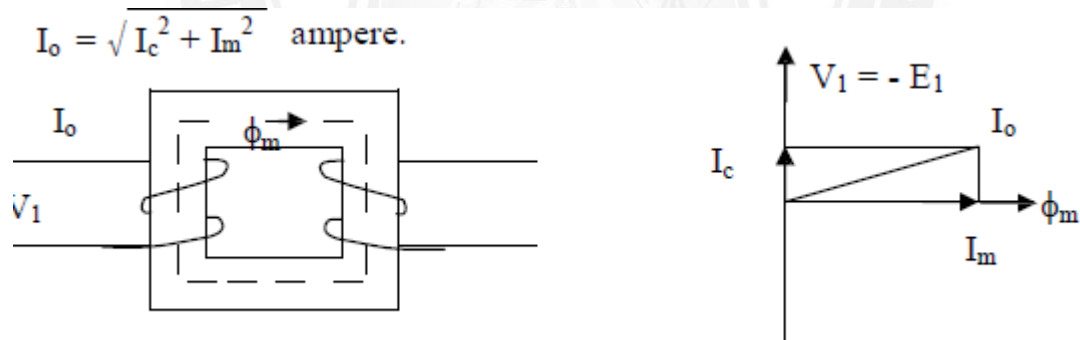
$$I_o = \sqrt{I_c^2 + I_m^2} \text{ ampere.}$$

Figure 2.5.1 Transformer under no-load condition Vector diagram of Transformer under no-load condition

[Source: "A Course in Electrical Machine Design" by A.K.Sawhney, page-5.98]