

COIL DESIGN

PROJECT : master
By : name
Date : 9feb01

<u>coil OD</u>	od := .985	<u>wire gauge</u>	awg := 30
<u>coil ID</u>	id := .500	<u>nom or min wire</u>	nm := 1 (1-nom, 0-min)
<u>coil length</u>	lg := 1.000	<u>film thickness</u>	flm := 1 (1-single , 2-double)
<u>voltage (volts)</u>	v := 9.0	<u>random or layer wind</u>	wind := 1 (1-random , 2-layer)
<u>maximum ambient (° F)</u>	temp := 155		

Random wind efficiency

$$\text{eff} := (\text{awg} - 32) \cdot .004 + .95$$

Wind efficiency eff = 1.0 for layer

$$\text{eff} := \text{if}(\text{wind} \neq 2, \text{eff}, 1)$$

$$\text{eff} = 0.942$$

Nom or min wire

$$k1 := \text{if}(\text{nm} = 1, .46, .453)$$

$$k2 := \text{if}(\text{nm} = 1, 3, 2.96)$$

$$\text{wire} := \frac{k1}{92 \left(\frac{\text{awg} + k2}{39} \right)}$$

Insulation

$$k3 := \text{if}(\text{flm} = 1, .518, .818)$$

$$\text{bld} := \frac{10 \left(\frac{k3 - \text{awg}}{44.8} \right)}{1000}$$

Overall wire diameter

$$\text{mag} := \text{wire} + \text{bld}$$

Turns

$$\text{tn} := \text{eff} \cdot \text{lg} \cdot \left(\frac{\text{od} - \text{id}}{2 \cdot \text{mag}^2} \right)$$

$$\text{res} := 1.358 \cdot 10^{-6} \cdot \text{tn} \cdot \left(\frac{\text{od} + \text{id}}{\text{wire}^2} \right)$$

$$\text{resmx} := \text{res} \cdot [1 + .00218 \cdot (\text{temp} - 68)]$$

$$\text{amp} := \frac{v}{\text{res}}$$

$$\text{ampm} := \frac{v}{\text{resmx}}$$

$$\text{amptn} := \frac{v}{\text{res}} \cdot \text{tn}$$

$$\text{amptm} := \frac{v}{\text{resmx}} \cdot \text{tn}$$

$$\text{cirmil} := \text{wire}^2 \cdot 10^6$$

$$\text{sqmil} := \text{wire}^2 \cdot \pi \cdot 250000$$

$$\text{lbsp1000} := \text{sqmil} \cdot .003854$$

(pounds/1000 ft)

$$\text{ohmp1000} := \frac{10371}{\text{cirmil}}$$

(ohms/1000 ft)

$$\text{coilwt} := \frac{\text{lbsp1000}}{\text{ohmp1000}} \cdot \text{res}$$

@ temp = 68 °F

@ temp = 155 °F

coil resistance

$$\text{res} = 39.81$$

$$\text{resmx} = 47.36$$

copper weight (lbs)

amp-turns

$$\text{amptn} = 448.5$$

$$\text{amptm} = 377.0$$

$$\text{coilwt} = 0.117$$

current

$$\text{amp} = 0.226$$

$$\text{ampm} = 0.190$$

turns

$$\text{tn} = 1984$$