SECTION I: IRON POWDER CORES

Iron Powder Cores are made in numerous shapes and sizes: such as Toroidal Cores, E-cores, Shielded Coil Forms, Sleeves etc., each of which is available in many different materials. There are two basic groups of iron powder material: (1) The Carbonyl Iron and, (2) The Hydrogen Reduced Iron.

The Carbonyl Iron cores are especially noted for their stability over a wide range of temperatures and flux levels. Their permeability range is from less than 3 μ_i to 35 μ_i and can offer excellent 'Q' factors from 50 KHz to 200 MHz. They are ideally suited for a variety of RF applications where good stability and good 'Q' are essential. Also, they are very much in demand for broadband inductors, especially where high power is concerned.

The Hydrogen Reduced Iron cores have higher permeabilities ranging from 35 μ_i to 90 μ_i. Somewhat lower 'Q' can be expected from this group of cores. They are mainly used for EMI filters and low frequency chokes. They are also very much in demand for input and output filters for switched mode power supplies.

The next several pages are devoted to iron powder materials and the toroidal core configuration in particular. You will find physical dimensions of available items, their A_L values and other magnetic properties, as well as how to select the proper core for your application.

In general, toroidal cores are the most efficient of any core configuration. They are highly self-shielding since most of the flux lines are contained within the core. The flux lines are essentially uniform over the entire length of the magnetic path and consequently stray magnetic fields will have very little effect on a toroidal inductor. It is seldom necessary to shield a toroidal inductor.

The A_L value of each iron powder core can be found in the charts on the next several pages. Use this A_L value and the formula below to calculate the number of turns for a specific inductance.

$$N = 100 \sqrt{\frac{\text{desired 'L' } (\mu h)}{A_L\ (\mu h/100 \text{ turns})}} \qquad L(\mu h) = \frac{A_L \times N^2}{10{,}000} \qquad A_L(\mu h/100 \text{ turns}) = \frac{10{,}000 \times \text{'L' } (\mu h)}{N^2}$$

N = number of turns L = inductance (μh) A_L = inductance index (μh)/100 turns)

Please see section IV on "Toroid Mounts & E-Core Bobbins" for information on mounting toroids to PC Boards. Amidon also provides complete wound and mounted cores.

- **For standard wound toroid, please see section V.**
- **For custom inductors based on your specifications, please call or fax today. You will be assured of prompt response with quotations in less than 72 hours.**
- **Amidon provides low cost manual and automated coil windings. Please call for more information.**