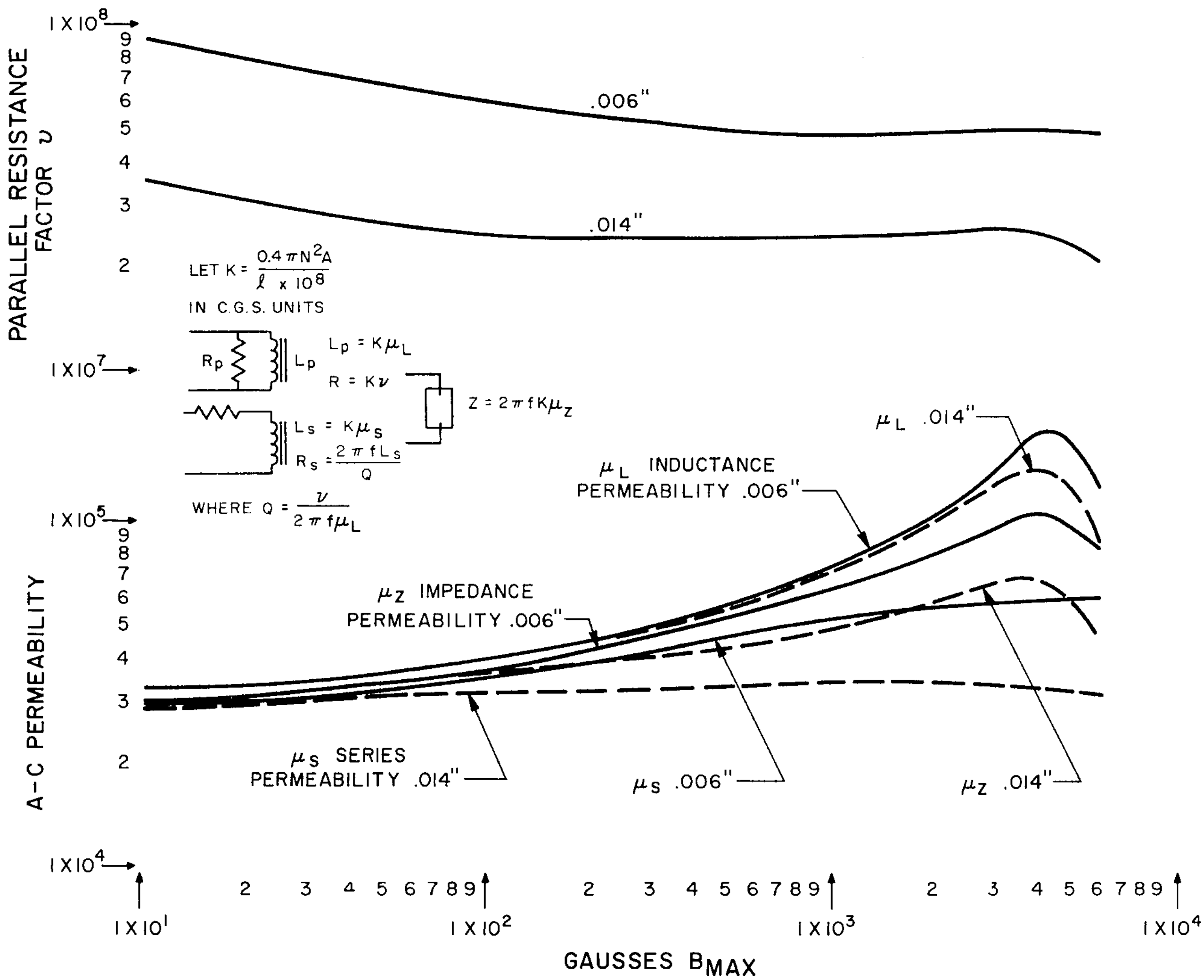
SUPER Q 80 LAMINATIONS

SUPER Q 80 LAMINATIONS are produced from specially selected 80% nickel-iron alloy. Exacting quality control procedures are followed to ensure the user consistent high permeability performance.

The data in this bulletin is a guide for the magnetic component design engineer's use in predicting the performance of Super Q 80 laminations.

INDEX

Permeability and core loss of typical material used in the manufacture of Super Q 80 laminations. Stamped Ring Laminations at 60 Hz.



MAGNETIC METALS CORP. CAMDEN, NEW JERSEY

PROPERTIES VS. FREQUENCY

SUPER Q 80

CORE LOSS of material used for production of Super Q 80 laminations is presented in two ways. On the first page and this page, the parallel resistance factor v can be used to calculate R_p. The core loss is then E^2/R_p. The curves on page three show the conventional watts per pound relationships. The relationship between v and watts per pound is

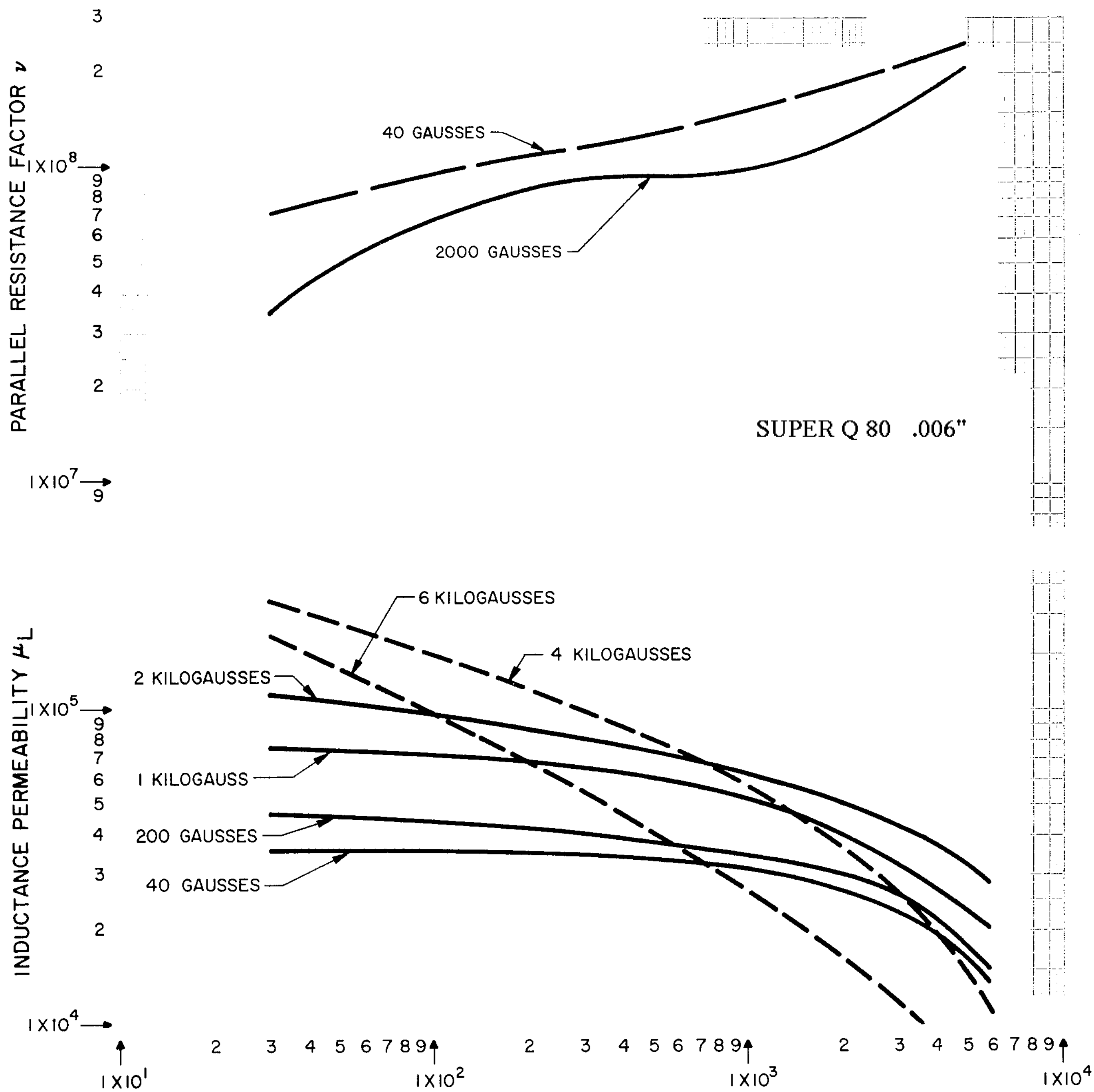
$$v = 0.81536 \frac{B^2_m f^2}{P_s} \times 10^{-5}$$

where B_m is the maximum induction in gausses

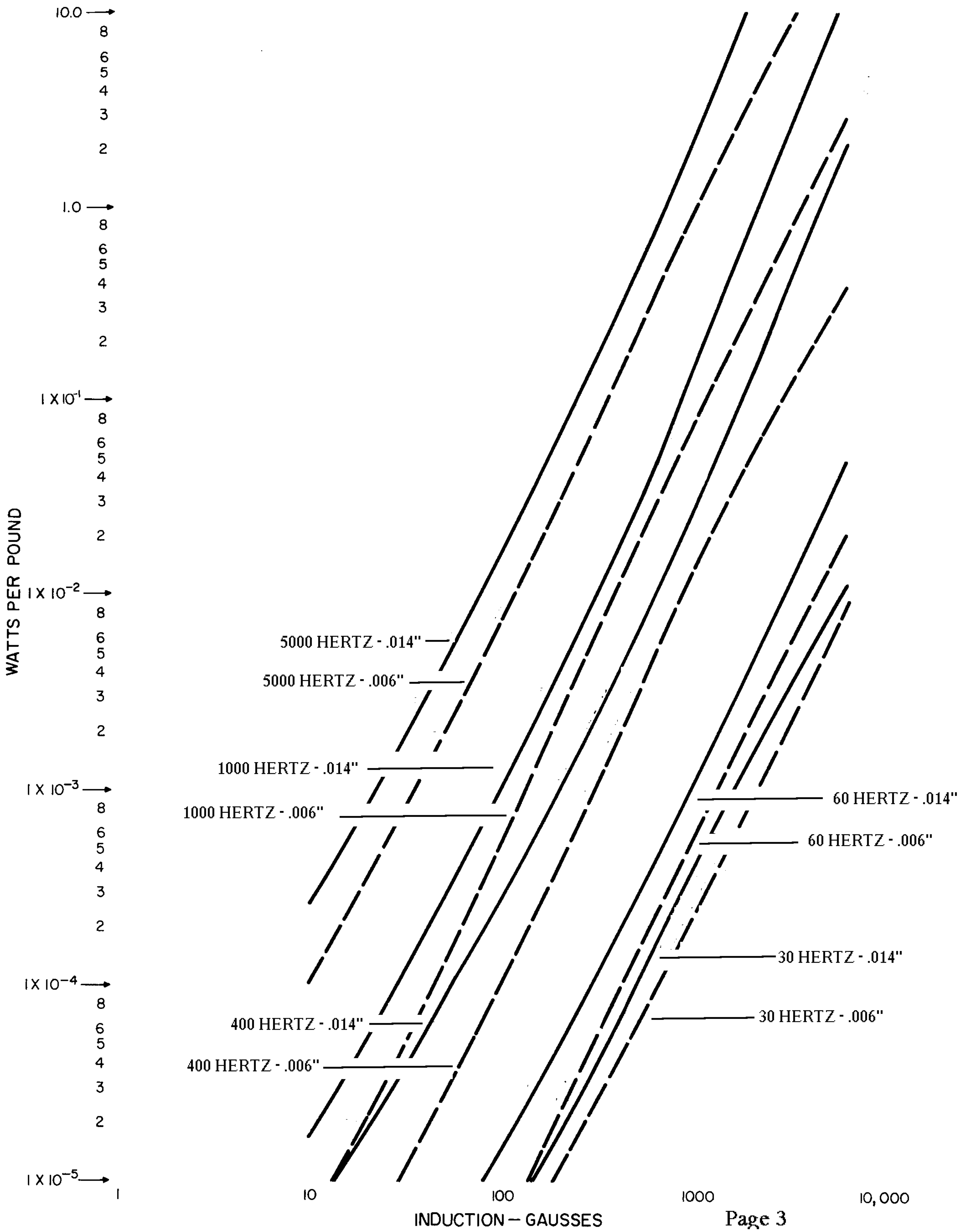
f is the frequency in Hertz

P_s is the specific core loss in watts per pound.

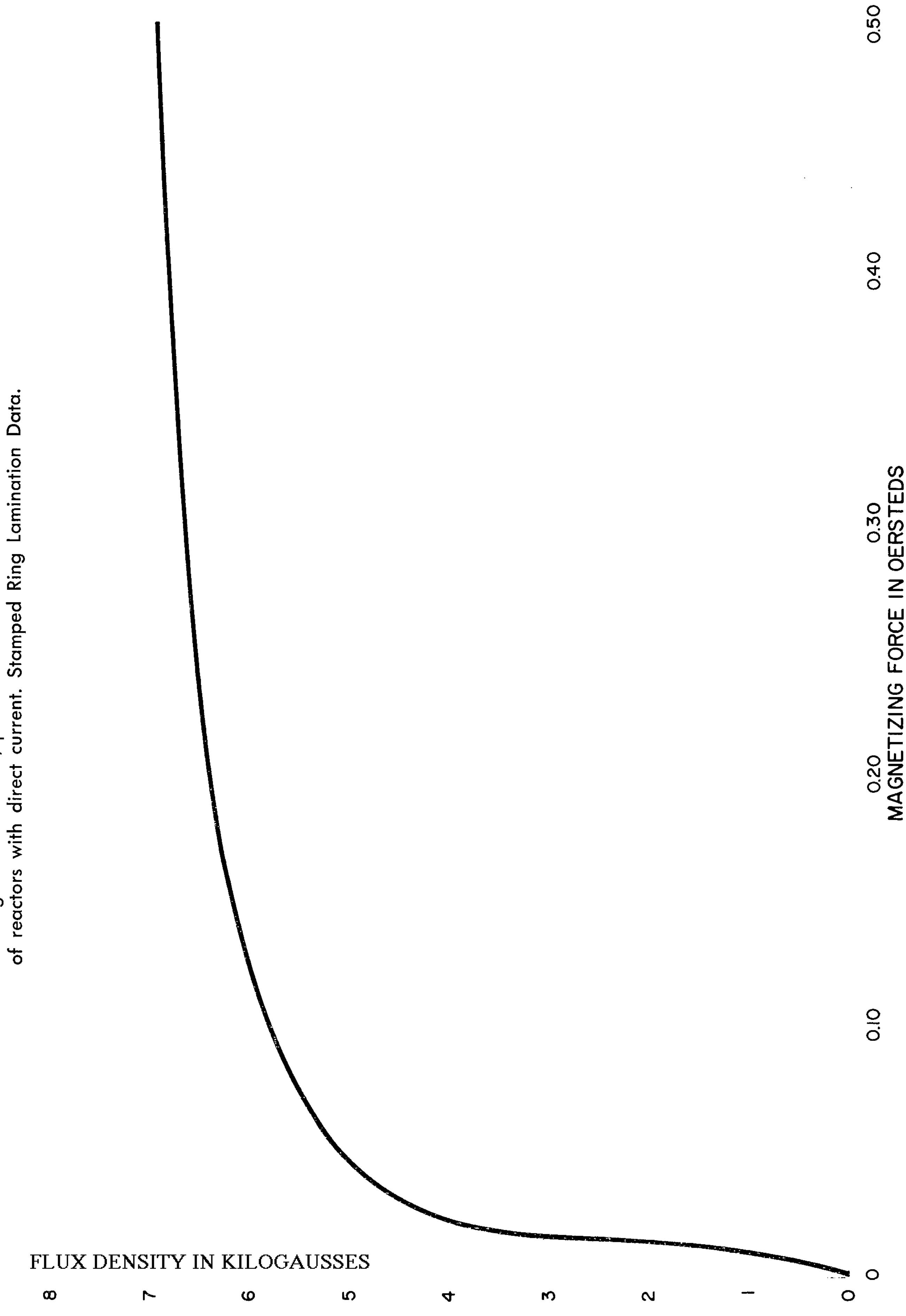
Variation of paralled resistance factor and permeability with frequency; typical material for Super Q 80 laminations; Modified Hay Bridge data using Stamped Ring Laminations.



Core loss curves in watts per pound; typical material for Super Q 80 laminations; Stamped Ring Lamination data.



SUPER Q 80

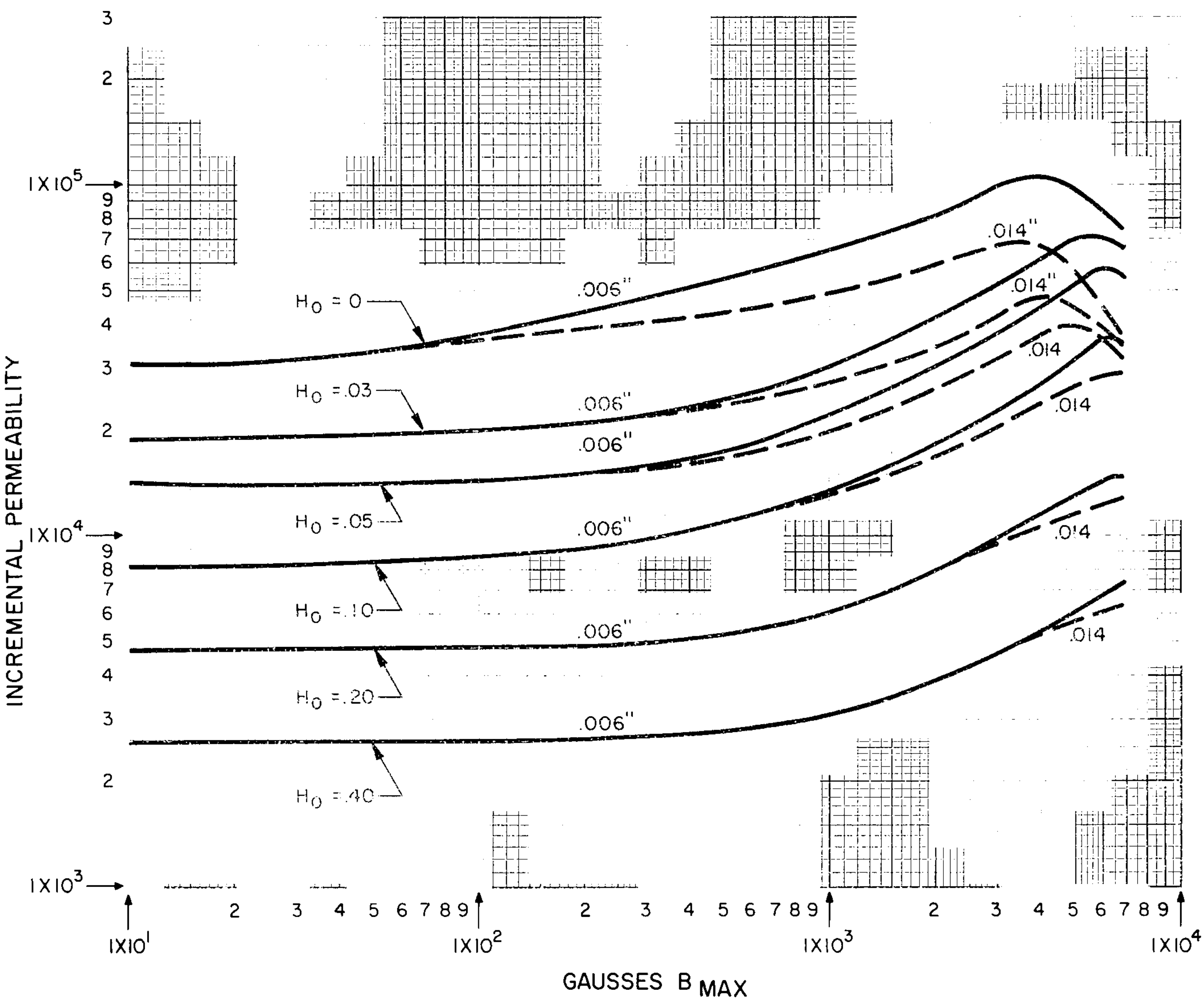


D-C magnetization curve, plotted with linear scales for calculation of reactors with direct current. Stamped Ring Lamination Data.

INDUCTANCE CALCULATION. The curves on pages four and five are useful for inductance calculation using the negative air gap line technique. For additional information, there are many texts on magnetic component design.*

**MAGNETIC CIRCUITS AND TRANSFORMERS: M.I.T. Staff, John Wiley and Sons, Inc., 7th printing 1950, p. 202*

Incremental permeability of typical material used in the manufacture of Super Q laminations. Stamped Ring Laminations at 60 Hz.

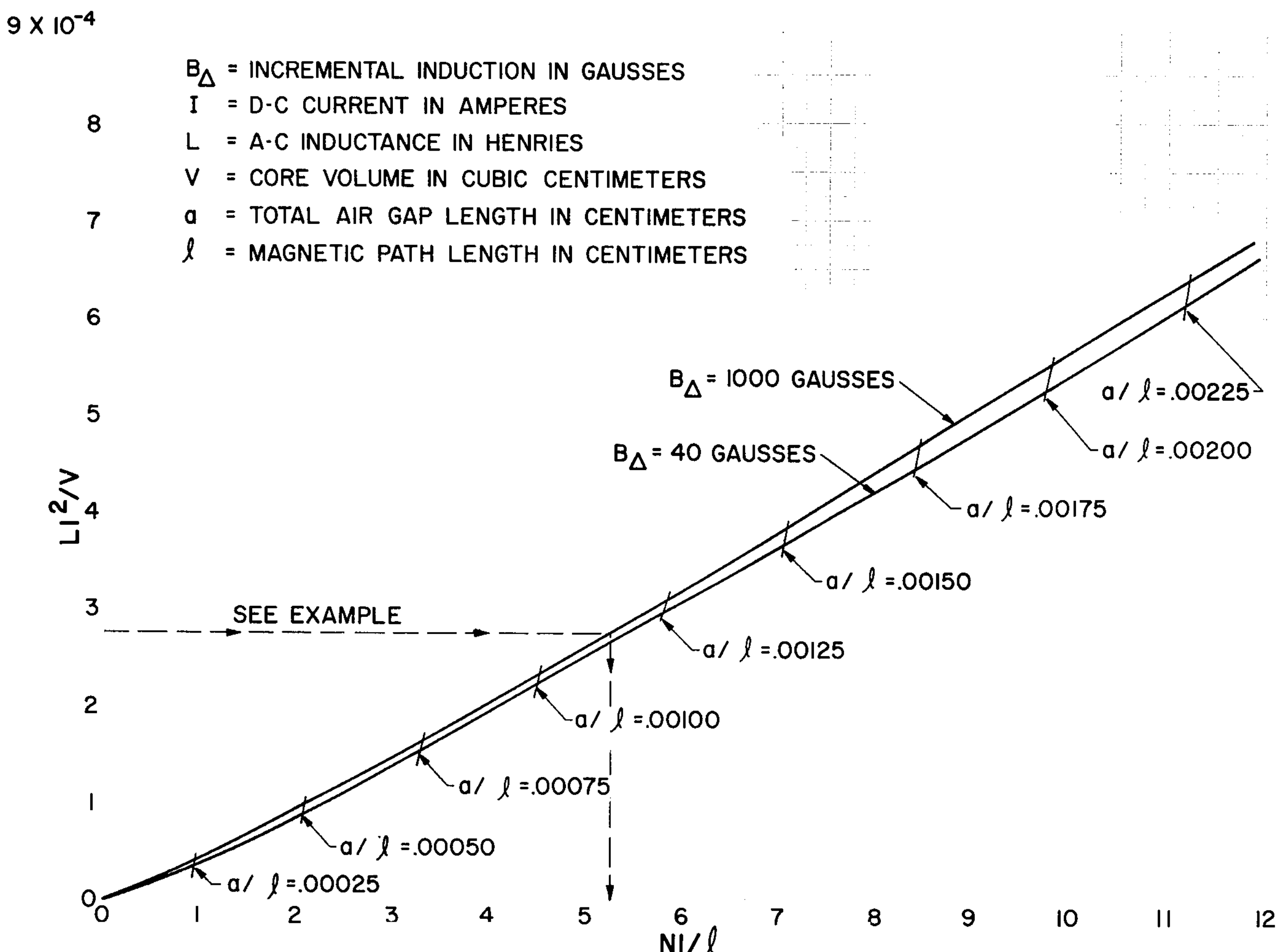


HANNA CURVES* provide a simplified method of calculating inductances with direct current, and for determining the optimum air gap. Where L is the a-c inductance in henries, I is the d-c current in amperes, and V is the core volume in cubic centimeters; calculate LI^2/V and enter the chart at that ordinate. Extend across the chart along this ordinate to the appropriate B_Δ, for a-c induction in gausses, and select the indicated abscissa for NI/ℓ. Calculate required turns by substituting the centimeters of path length in the core material for ℓ, and for the d-c amperes I. The optimum ratio of air gap length to path length (a/ℓ) applies to the points indicated.

Example: Required L = 1.41 henries in 2425-EE SM 30 with I = .020 amperes d-c. From lamination catalog, V = 2.05 cm^3 and ℓ = 5.08 cm. Calculate LI^2/V = 2.75 x 10^{-4}. For estimated B_Δ = 1000 gausses, NI/ℓ = 5.25 and a/ℓ lies between .0010 and .00125. Substituting for I and ℓ, N = 1335 turns. The total air gap is approximately a = .0010 x 5.08 = .00508 cm or .002 inches. A spacer .001 inch thick will establish this total air gap.

*"*Design of Reactors and Transformers which Carry Direct Current*", *C. R. Hanna, Journal AIEE, Vol. 46, February 1927.*

Hanna Reactor Design Curves.
Data prepared from Stamped Ring Lamination measurements at 60 Hz.



Impedance permeability at 60 Hz. of typical lamination shapes.
Curves are drawn through rejection levels at test inductions.