# TERMS & DEFINITIONS

## 1 .Initial **permeability,** $\mu$

**The initial permeability $\mu_i$ is the limit value at the initial magnetization curve's origin point and is given by the following formula:**

$$\mu_i = \frac{1}{\mu_0} \lim_{H \to 0} \frac{B}{H}$$

**Where $\mu_0$: Permeability of vacuum($4\pi \times 10^{-7}$ H/m)**
**H : Magnetic field strength (A/m)**
**B : Magnetic flux density(T)**

## 2.Effective permeability,$\mu_e$

**This is usually defined as the permeability of a core forming a closed circuit where leskage flux is negligibly small.**

$$\mu_e = \frac{L}{\mu_0 N^2} \cdot \frac{Ie}{Ae}$$

**Where L:self-inductance of core with coil(H)**
**N:number of turns**
**Le:effective magnetic path length(m)**
**Ae:effective cross-sectional area($m^2$)**

## 3.Saturation **magnetic flux density, Bs (T)**

**The magnetic flux density at a magnetic field where H is up to an approximate saturation magnetic field value.(Fig.l)**

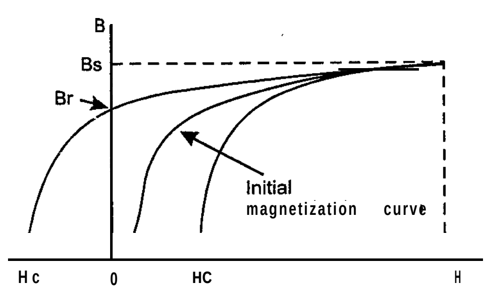


Fig.1

## 4.Residual magneic **flux density, Br**

**The value offlux density retained by the Core when the magnetic field is reduced From the stare of the effective saturation magnetic flux density to zero. (Fig.1)**

## 5.**Coercivity,Hc(A/m)**

**The value of magnetie field strength whereby the flu density becomes zero under the intensification, in the opposite direction, of the magnetic field.(Fig.1)**

## 6.**Loss factor, tan** $\delta$

**This is the sum of the hysteresis loss factor, eddy current loss factor and residual loss factor.**

$$\tan\delta = \tan\delta_h + \tan\delta_e + \tan\delta_r$$

**Where $\tan\delta_h$ is the hysteresis loss factor**
**$\tan\delta_e$ is the eddy current loss factor**
**tan S $_r$ is the residual loss factor**

## 7.**Relative loss factor,tan** $\delta/\mu$

**This is the ratio of loss factor to permeability.**
$\tan\delta/\mu$, **(for materials)**
$\tan\delta/\mu_e$ **(for cores with gaps in the magnetic circuit)**

## 8.**Quality** factor,Q

**This is the reciprocal of the loss factor and is given by** $Q=1/\tan\delta$.

## 9.**Temperature** coefficient, $\alpha_\mu$ **(l/K)**

**This is the fractiona! Difference of permeability per 1 K in temperature range of from $T_1$to$T_2$**

$$\alpha_\mu = \frac{\mu_2 - \mu_1}{\mu_1} \cdot \frac{1}{T_2 - T_1} \qquad (T_2 > T_1)$$

**Where permeability at temperature$T_1$.**
**permeability at temperature$T_2$.**

## 10.**Relative** temperature **coefficient,**$\alpha_{\mu r}$**(1/K/)**

**This is the temperature coefficient per unit permeability and is given by the following equation:**

$$\alpha_{\mu r} = \frac{\mu_2 - \mu_1}{\mu_2^{\,2}} \cdot \frac{1}{T_2 - T_1} \qquad (T_2 > T_1)$$

## 11 .**Curie** temperature,Tc

**It is the critical temperature level at which the ferromagnetic state of the material changes to paramagnetic state.(Fig.2)**

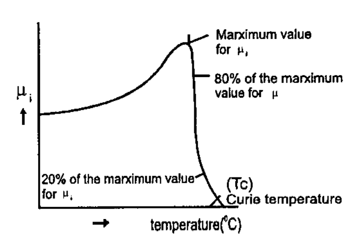


Fig.2

## 12.Disaccommodation factor,$D_F$

**This is the factor representing the variation of permeabiliy through time after a complete demagnetization of the core at a constant temperature.**

$$D_F = \frac{\mu_1 - \mu_2}{\log\frac{T_2}{T_1}} \cdot \frac{1}{\mu_1^2} \qquad (T_2 > T_1)$$

**Where $\mu_1$ : permeability $t_1$ minutes after complete demagnetization.**
**$\mu_2$: permeability $t_2$ minutes after complete demagnetization.**

## 13.Electrical resistivity, $\rho$ (Q/m)

This is the electrical resistance per unit length and cross-sectional area of a magnetic core.

## 14.Density,d(kg/$m^3$)

This is the weight per unit volume of a magnetic core as expressed below:

$$d=W/V$$

Where W: weight of magnetic body (kg)
V: volume of magnetic body ($m^3$)

## 15.Power loss Pc (kw/$m^3$、W/kg)

**Power loss denotes the loss by an electrical transformer, such as a switching power supply, under a magnetization condition** Featuring a high frequency and large amplitude. Operating magnetic flux density is given by the following equation.

$$Bm=\frac{E}{4.44fNAe}$$

Where E: voltage effective value applied to coil

Bm: peak value of magnetic fluxdensity

f: frequency (Hz)

N: number of coil turns

Ae: effective cross-sectional area (m')

At present, the usual ways to measure the power loss are Multi-voltmeter Method and Waveform Memory Method.

## 16.Inductance factor A,

This is the inductance per turn of the coil wound around the ferrite cores with definite shape and dimension.

$$A_L=L/N^2$$

Where L: inductance of the coil with ferrite core.
N: turns of the coil