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Standard Terminology of Symbols and Definitions Relating to Magnetic Testing¹

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INTRODUCTION

In preparing this glossary of terms, an attempt has been made to avoid, where possible, vector analysis and differential equations so as to make the definitions more intelligible to the average worker in the field of magnetic testing. In some cases, rigorous treatment has been sacrificed to secure simplicity, but it is believed that none of the definitions will prove to be misleading.

It is the intent of this glossary to be consistent in the use of symbols and units with those found in ANSI/IEEE 260-1978 and USA Standard Y 10.5-1968.

Part 1—Symbols Used in Magnetic Testing

Symbol	Term		
α	cross-sectional area of B coil	H_D	biasing magnetic field strength
A	cross-sectional area of specimen	H_c	coercive field strength
A'	solid area	H_{ci}	intrinsic coercive field strength
B	$\left\{ \begin{array}{l} \text{magnetic induction} \\ \text{magnetic flux density} \end{array} \right.$	H_{cs}	coercivity
ΔB	excursion range of induction	H_d	demagnetizing field strength
B_D	biased induction	H_{Δ}	incremental magnetic field strength
B_d	remanent induction	H_g	air gap magnetic field strength
B_{dm}	remanence	H_L	ac magnetic field strength (from an assumed peak value of magnetizing current)
$B_d H_d$	energy product	H_m	maximum magnetic field strength in a hysteresis loop
$(B_d H_d)_m$	maximum energy product	H_{max}	maximum magnetic field strength in a flux-current loop
B_{Δ}	incremental induction	H_p	ac magnetic field strength (from a measured peak value of exciting current)
B_i	intrinsic induction	H_t	instantaneous magnetic field strength (coincident with B_{max})
B_m	maximum induction in a hysteresis loop	H_z	ac magnetic field strength force (from an assumed peak value of exciting current)
B_{max}	maximum induction in a flux current loop	I	ac exciting current (rms value)
B_r	residual induction	I_c	ac core loss current (rms value)
B_{rs}	retentivity	I_{dc}	constant current
B_s	saturation induction	I_m	ac magnetizing current (rms value)
cf	crest factor	J	magnetic polarization
CM	cyclically magnetized condition	K'	coupling coefficient
d	lamination thickness	ℓ	flux path length
D_B	demagnetizing coefficient	ℓ_1	effective flux path length
df	distortion factor	ℓ_g	gap length
D_m	magnetic dissipation factor	$\mathcal{L}$ (also ϕN)	flux linkage
E	exciting voltage	$\mathcal{L}_m$	mutual flux linkage
E_1	induced primary voltage	L	self inductance
E_2	induced secondary voltage	L_1	core inductance
E_f	flux volts	L_{Δ}	incremental inductance
f	cyclic frequency in hertz	L_i	intrinsic inductance
$\mathcal{F}$	magnetomotive force	L_m	mutual inductance
ff	form factor	L_0	initial inductance
H	magnetic field strength	L_s	series inductance
ΔH	excursion range of magnetic field strength	L_w	winding inductance
		m	magnetic moment
		M	magnetization
		m	total mass of a specimen
		m_1	active mass of a specimen
		N_D	demagnetizing factor
		N_1	turns in a primary winding

¹ This terminology is under the jurisdiction of ASTM Committee A06 on Magnetic Properties and is the direct responsibility of Subcommittee A06.92 on Terminology and Definitions.

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