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Standard Terminology of Symbols and Definitions Relating to Magnetic Testing¹

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^{ε1} NOTE—Editorial changes were made throughout in September 2002.

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

¹ These definitions are under the jurisdiction of ASTM Committee A06 on Magnetic Properties and are the direct responsibility of Subcommittee A06.92 on Terminology and Definitions.

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