

TRAFOPERM N4

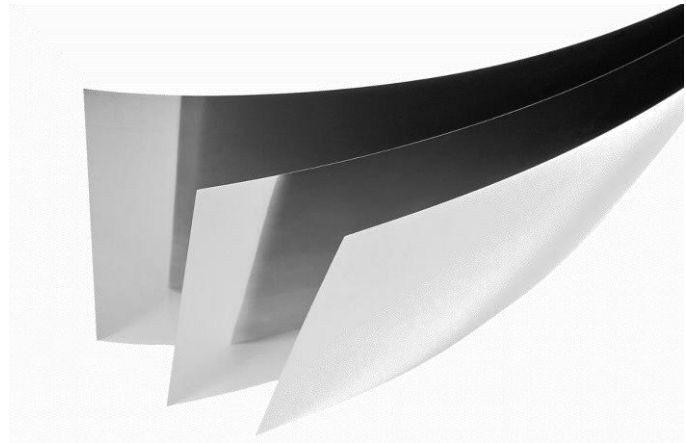
COMPOSITION (in wt%)

2.4 Si – 0.4 Al – bal. Fe
IEC 60404-8-6 C 1

PRODUCT DESCRIPTION

VACUUMSCHMELZE delivers the low-textured 3 % SiFe alloy TRAFOPERM® N4 as strip material for various applications such as transformer cores and current sensors.

The saturation of TRAFOPERM N4 is only slightly below the one of pure iron, while its electrical resistivity is four times larger resulting in lower specific iron losses.



TYPICAL APPLICATIONS

Transformer cores, current and position sensors, needle printers, relay parts, pole shoes and flux concentrators.

MAIN PROPERTIES

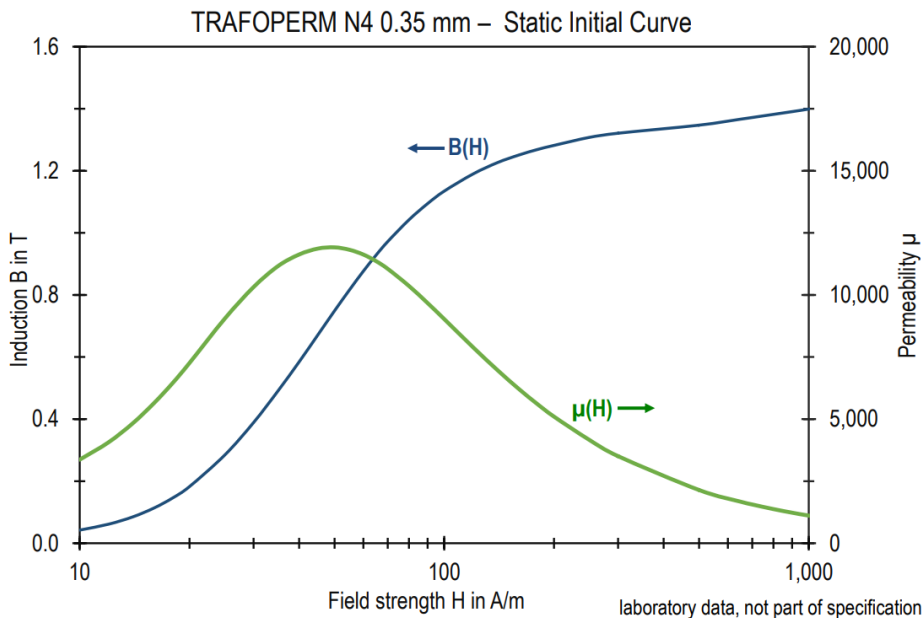
- Coercivity $H_C < 24 \text{ A/m}^*$
 - Electrical resistivity $\rho_e = 0.4 \mu\Omega\text{m}$
- *annealed at 5 h 1,150 °C

FORMS OF SUPPLY

- Strip material, thickness 0.1 – 1.4 mm, width max. 305 mm
- Stamped parts, laminations, and laminated assemblies

Other dimensions and tolerances upon request.

For 3 % SiFe solid material, please refer to TRAFOPERM N3.



STRIP MATERIAL 0.35 mm – TYPICAL VALUES

PHYSICAL PROPERTIES	Unit	
Mass density ρ	g/cm ³	7.65
Thermal conductivity (25 °C) λ	W/(m·K)	25
Thermal expansion coefficient (20 – 100 °C) α	10 ⁻⁶ /K	13
Electrical resistivity ρ_e	$\mu\Omega\text{m}$	0.4

STATIC MAGNETIC PROPERTIES		
Coercivity H_c (heat treated 5 h 1,150 °C)	A/m	18
Saturation polarization J_s	T	2.03
Maximum permeability μ_{max}		12,000
Magnetostriction constant λ_s	ppm	7 – 9
Curie temperature T_C	°C	750

SPECIFIC IRON LOSSES OF STRIP MATERIAL AFTER FINAL HEAT TREATMENT		strip thickness	
		0.20 mm	0.35 mm
p_{Fe} 1.0 T 50 Hz	W/kg	0.8	1.0
p_{Fe} 1.0 T 400 Hz	W/kg	13	21
p_{Fe} 1.0 T 1,000 Hz	W/kg	47	89
p_{Fe} 1.5 T 50 Hz	W/kg	2.3	2.7
p_{Fe} 1.5 T 400 Hz	W/kg	32	54
p_{Fe} 1.5 T 1,000 Hz	W/kg	118	260

MECHANICAL PROPERTIES (finally heat treated 5 h 1,150 °C)		
Young's modulus E	GPa	180
Yield strength $R_{p0.2}$	MPa	280
Hardness	HV	160

MECHANICAL PROPERTIES (delivery state)		cold rolled	soft annealed
Yield strength $R_{p0.2}$	MPa	950	440
Tensile strength R_m	MPa	960	540
Elongation A	%	< 1	N/A
Hardness	HV	> 250	170

RECOMMENDED PARAMETERS FOR THE FINAL HEAT TREATMENT		
Atmosphere		Dry hydrogen
Temperature	°C	850 – 1,150
Annealing time	h	3 – 6
Cooling rate	K/h	100

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