

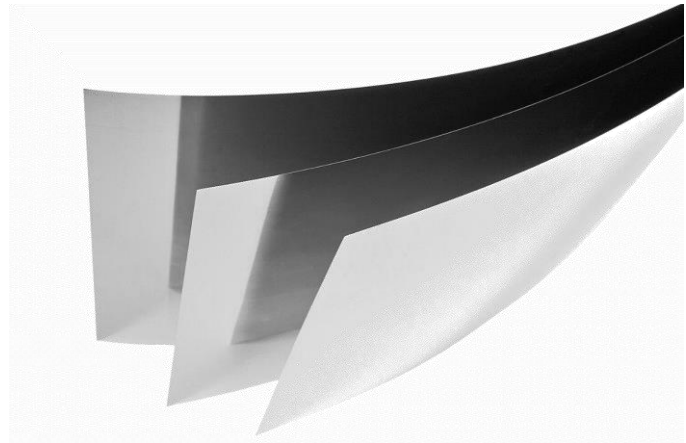
CHRONOPERM 36

COMPOSITION (in wt%)

36.4 Ni – 6.8 Cr – bal. Fe

PRODUCT DESCRIPTION

CHRONOPERM® 36 is a cost efficient alloy that has specifically been developed for use in stator laminations of stepping-motors (Lavet-type Motors) in electro-mechanical clocks. The magnetic saturation of CHRONOPERM 36 matches with previously used 80 % NiFe alloys, while its low Ni-content significantly reduces the raw material costs of the alloy.



TYPICAL APPLICATIONS

Stator laminations for stepping motors of electro-mechanical clocks

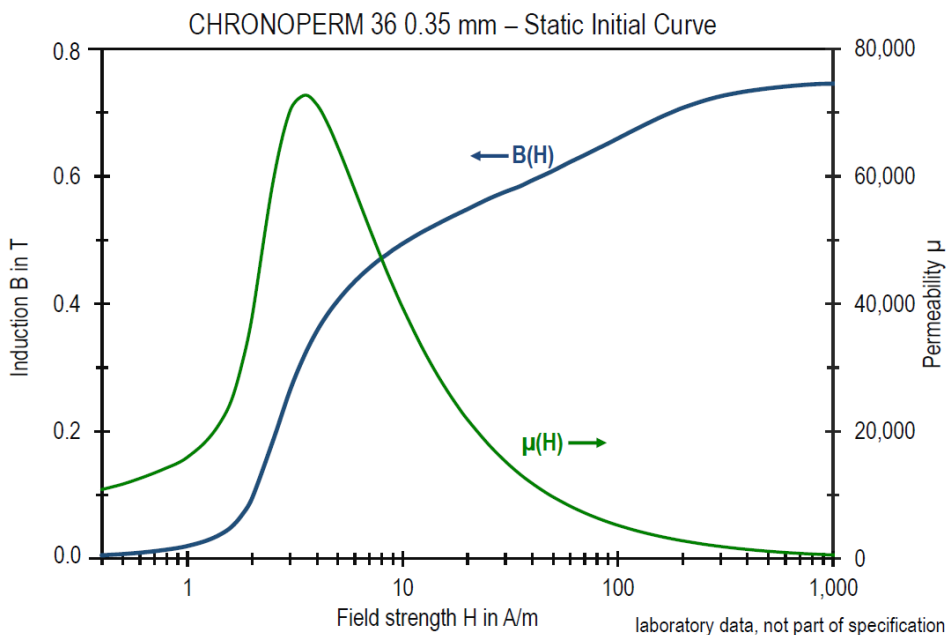
MAIN PROPERTIES

- Saturation induction $J_S = 0.75$ T
 - Electrical resistivity $\rho_e = 0.93 \mu\Omega\text{m}$
 - Max. permeability $\mu_{\text{max}} = 60,000^*$
- *typical for thickness 0.35 mm, data for other dimensions upon request

FORMS OF SUPPLY

- Strip material, thickness 0.025 – 2 mm, width ≤ 305 mm
- Stamped parts, laminations, and laminated assemblies

Other dimensions and tolerances upon request.



STRIP MATERIAL 0.35 mm – TYPICAL VALUES

PHYSICAL PROPERTIES	Unit	
Mass density ρ	g/cm ³	8.2
Thermal conductivity (25 °C) λ	W/(m·K)	13 – 14
Thermal expansion coefficient (20 – 100 °C) α	10 ⁻⁶ /K	6.3
Electrical resistivity ρ_e	$\mu\Omega\text{m}$	0.93

STATIC MAGNETIC PROPERTIES		
Coercivity H_c	A/m	3
Saturation polarization J_s	T	0.75
Saturation magnetization B_s at $H = 40$ kA/m	T	0.80
Maximum permeability μ_{max}		60,000
Magnetostriction constant λ_s	ppm	+ 25
Curie temperature T_c	°C	165

SPECIFIC IRON LOSSES OF STRIP MATERIAL AFTER FINAL HEAT TREATMENT		strip thickness 0.35 mm
p_{Fe} 0.5 T 50 Hz	W/kg	0.06
p_{Fe} 0.5 T 400 Hz	W/kg	1.7
p_{Fe} 0.5 T 1,000 Hz	W/kg	8.7
p_{Fe} 0.7 T 50 Hz	W/kg	0.14
p_{Fe} 0.7 T 400 Hz	W/kg	3.4
p_{Fe} 0.7 T 1,000 Hz	W/kg	19

MECHANICAL PROPERTIES (finally heat treated)		
Young's modulus E	GPa	170
Yield strength $R_{p0.2}$	MPa	100
Hardness	HV	95

MECHANICAL PROPERTIES (cold rolled)		
Yield strength $R_{p0.2}$	MPa	840
Tensile strength R_m	MPa	870
Elongation A	%	1
Hardness	HV	260

RECOMMENDED PARAMETERS FOR THE FINAL HEAT TREATMENT		
Atmosphere		hydrogen
Temperature	°C	1,150
Annealing time	h	5
Cooling rate	K/h	100 – 300

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