

A photograph showing several sheets of shielding foil. One sheet is partially unrolled, revealing a metallic, reflective surface. The sheets are stacked and slightly offset, showing their edges and the way they are handled.

Shielding Foils from Amorphous VITROVAC[®] 6025 I50X

Magnetic Shielding Foils

Magnetic shielding foils are used for shielding problems in the lower frequency and field strength range. Either as a “quick and dirty” approach to get the direction for a later more massive shielding, or as a light and flexible solution where the effectiveness of the relatively thin foils is sufficient.

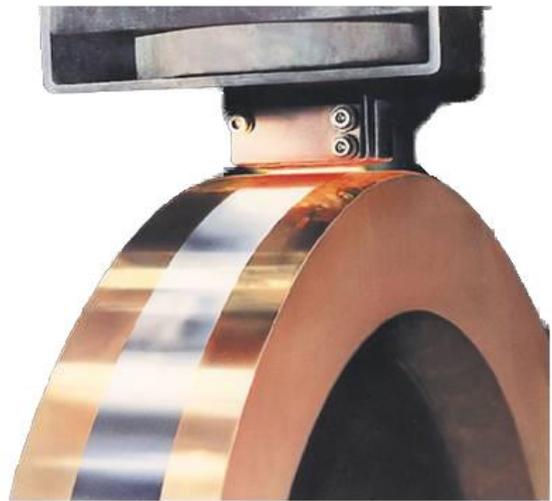
Crystalline soft magnetic alloys (e. g. MUMETALL[®]) need to be heat treated in order to optimize their soft magnetic behavior (permeability, coercivity). The magnetic “softening” comes along with a mechanical softening however. As elastic tensions and especially plastic deformation dramatically reduce the shielding effectiveness, such thin and soft foils need to be handled with great care.

Shielding Foils from VITROVAC[®] 6025 I50X

Untypically for a soft magnetic metal foil, amorphous VITROVAC[®] 6025 I50X combines a high mechanical hardness and flexibility with excellent magnetic properties. Thus it features much higher permeability values compared with a MUMETALL[®] foil. Furthermore VITROVAC[®] 6025 I50X is extremely insensitive against mechanical stress due to a practically zero magnetostriction. The foils can be bent to minimal radii w/o plastic deformation.

Production

VITROVAC® 6025 I50X is a soft magnetic metallic foil with an amorphous atomic structure. The production requires a special rapid solidification technique which freezes the melt without allowing the atoms to find their place in a crystalline structure. In order to achieve this, cooling rates of about 1 million Kelvin per second are required, plus a few boundary conditions with respect to the alloy composition.



Applications

Main applications are cable shielding of thin cables with high flexibility. Furthermore amorphous shielding foils can be a quick solution wherever small magnetic fields cause problems, where a flexible shielding is necessary, or where a thin and highly robust magnetic material with excellent magnetic and mechanical properties is required. Due to the low strip thickness the foils show an excellent frequency response.

Properties and Workability

VITROVAC® 6025 I50X is a very hard and fairly elastic thin foil which may be cut to length or shape with scissors. Bending is possible down to a radius of almost zero w/o plastic deformation.

Safety Indication

Tearing or cutting the foil may produce small slivers, therefore always use protecting glasses and gloves when working with the foil. Please be also aware of the sharp edges which may cause serious injuries.

Forms of Supply

VITROVAC® 6025 I50X is cast in widths of 50 or 55 mm and slit with circular scissors to smaller widths. Widths of 25 mm or more can also be cast directly, however with somewhat higher tolerances of the width. Usual widths are 10, 20, 25, 35 or 50 mm. The tolerance of the widths of slit strips is ± 0.15 mm. The strips are also available with an adhesive layer with protective film.

Magnetic Properties (typical)

Saturation induction	B_s	[T]	0.55	RT
Curie temperature	T_c	[°C]	225	
Saturation magnetostriction	$ \lambda_s $	ppm	< 0.2	RT
Coercivity	H_c	[A/m]	< 4	20 A/m; 60 Hz
Initial permeability	μ_2		> 10000	0.2 A/m, stat.
Maximum permeability	μ_{max}		> 100000	static
Remanence	B_r/B_s		~ 0.7	static

Mechanical, Physical and Chemical Properties (typical)

Composition			$Co_{69} Fe_4 Mo_3 (Nb Si B)_{Rest}$	
Density		[g/cm ³]	7.86	
Strip thickness	d	[μ m]	19 - 25	Via weight per length
Specific electrical resistivity		[Ω m]	1.35×10^{-6}	TR
Thermal expansion coefficient		[K ⁻¹]	12×10^{-6}	20 - 100 °C
Crystallization temperature	T_x	[°C]	530	Heating rate 10 K/min
Young's module	E	[GPa]	~160	
Vickers hardness	HV ₀₂	[kp/mm ²]	~1000	

Typical hysteresis loops of tape-wound cores from VITROVAC® 6025X

VITROVAC® 6025 I50X comparably insensitive against mechanical stresses and features excellent frequency properties. However being a semi-finished material there are some variations from batch to batch within defined tolerances for e. g. strip-thickness and magnetostriction. The following diagram shows typical B(H) characteristics after winding the strip to toroidal cores w/o further treatment.

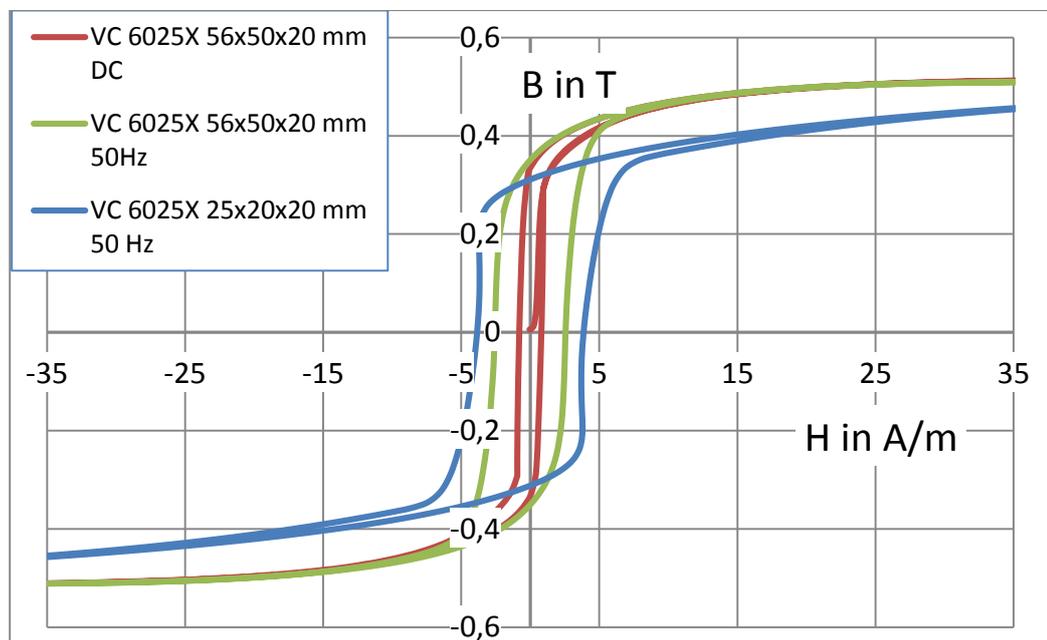


Fig. 1: Typical hysteresis loops of VITROVAC® 6025 I50X

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SEKELS GmbH has a long lasting experience in the field of magnetic shielding. We are familiar with the alloys and their processing and have a high variety of shielding alloys in various size available ex stock. This is supplement by design and measuring services.

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