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THORLABS

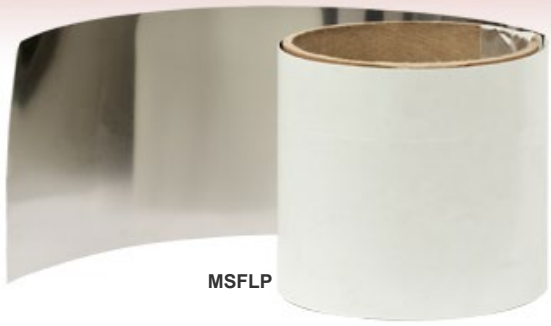
MSFLP - January 25, 2022

Item # MSFLP was discontinued on January 25, 2022. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

MAGNETIC SHIELDING FOILS

- Shielding from Electromagnetic Interference and External Magnetic Fields
- Protect Sensitive Electronic Equipment or Appliances
- High and Low Permeability Options Available

MSFHP



MSFLP

OVERVIEW

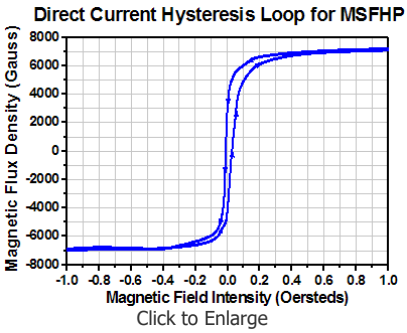
Features

- Protect Sensitive Electronic Equipment from Strong Magnetic Fields
- Choose from Versions Offering Either High or Low Permeability
- Combine High and Low Permeability Foils for Additional Magnetic Shielding Options
- Pressure-Sensitive Adhesive Backing for Easy Installation
- Please Contact Tech Support for Custom Foil Lengths/Widths

Thorlabs' Magnetic Shielding Foil, offered in high and low permeability versions, provides effective protection for application setups with sensitive electronic equipment whose normal operation can be affected by electromagnetic interference (EMI) and strong external magnetic fields. The high-permeability foil (MSFHP) works by easily absorbing external magnetic fields and redirecting them through the foil. Due to its high saturation induction characteristics, the low-permeability foil (MSFLP) is ideal for attenuating very strong, high-flux external fields. Combine both the high- and low-permeability foils to create one shield that provides the widest range of magnetic shielding. Please see the *Graphs* tab for hysteresis plots, permeability plots, and information about selecting a foil based on the expected magnetic field strengths.

Item #	MSFHP	MSFLP
Typical Shielding Properties		
Initial Permeability at 40 gauss	55,000 – 75,000	300
Permeability at 100 - 200 gauss	70,000 – 100,000	1,300
Maximum Permeability	230,000 – 300,000	3,000
Saturation Induction	7,600 – 8,000 gauss (0.76 – 0.80 tesla)	22,000 gauss (2.2 tesla)
Coercivity	<0.015 oersted	1 oersted
Physical Properties		
Foil Thickness	0.152 mm (0.006")	0.102 mm (0.004")
Foil Width	102 mm (4")	102 mm (4")
Roll Length	1 m (39.4")	1 m (39.4")
Foil Density	8746.8 kg/m^3 (0.316 lb/in^3)	7833.4 kg/m^3 (0.283 lb/in^3)

GRAPHS



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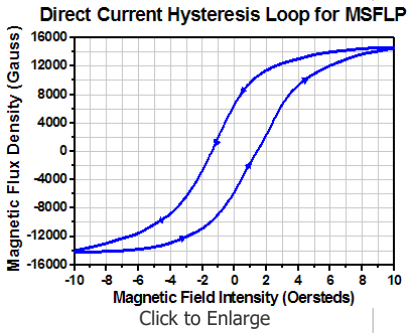

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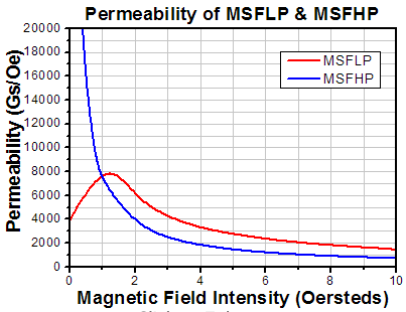
The graphs above show the DC hysteresis loop for both the MSFHP and MSFLP magnetic shielding foils. The high permeability of the MSFHP foils produces a compressed hysteresis from ~ -1 to 1 Oe. In contrast, the high saturation induction of the MSFLP foils yields a hysteresis over a much larger range of field strengths (~ -10 to 10 Oe). The hysteresis loops demonstrate the range of field strengths where the foil is best used. To understand which foil is best used for a particular application, we must first consider the attenuation of the foil.



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When designing a magnetic shield, the most important parameter to consider is the attenuation (g) of the magnetic field. This is just the ratio of the magnetic field intensity outside the shield (H_o) to that inside the shield (H_i). When creating a cylindrical shield, the attenuation can be expressed as the following.

$$g = \left(\frac{\mu}{4}\right)\left(1 - \frac{R_{in}}{R_{out}}\right) \approx \frac{\mu T}{2R_{out}}$$

In this equation R_{in} is the inside radius of the shield, R_{out} is the outside radius of the shield, T is the material thickness (R_{out} - R_{in}), and μ is the permeability of the foil. The attenuation of the magnetic field, therefore, is a factor of the foil's thickness and permeability. The equation above holds true for cylinders with a Length/Radius ≥ 4.

The graph to the left shows the permeability of the MSFHP and MSFLP foils. Permeability is a measure of a material's ability to conduct magnetic fields through its volume. High permeable materials have a strong response to external magnetic fields and will also produce higher attenuation. The relationship B=μH shows that the permeability is the ratio of the magnetic flux density (B) to the magnetic field intensity (H) and is often expressed in units of Gauss/Oersteds (Gs/Oe). From the graph to the left we see that for low magnetic field intensities (0 Oe< H <1 Oe) the MSFHP foil's permeability is much greater than that of the MSFLP foil, and thus serves as the better shielding material. For larger magnetic field intensity (H>1 Oe), the MSFLP foil will have the higher permeability and thus offers greater attenuation at these higher field intensities.

Part Number	Description	Price	Availability
MSFHP	High-Permeability Magnetic Shielding Foil, 1 m x 102 mm x 0.152 mm	$158.62	7-10 Days
MSFLP	Low-Permeability Magnetic Shielding Foil, 1 m x 102 mm x 0.102 mm	$76.06	7-10 Days