



**ANDOVER CORPORATION**  
Quality Optical Filters and Coatings  
**2009 - 2010**

## ORDERING INFORMATION

### Four Ways to Order

<b>Online</b>	<b>www.andovercorp.com</b>
<b>Email</b>	<b>sales@andovercorp.com</b>
<b>Telephone</b>	<b>US toll-free 1.888.893.9992</b> <b>International +00.1.603.893.6888</b>
<b>Fax</b>	<b>603.893.6508</b>

### Pricing

Current prices are available at [andovercorp.com](http://andovercorp.com) by clicking on the part numbers for particular items. For a complete price list or a specific quote, please contact our sales department.

### Purchase Orders

Andover Corporation accepts e-mail, written, and online orders from customers with an open line of credit. New customers must confirm their orders in writing and supply credit references upon request.

### Blanket Orders

Andover Corporation can help reduce your inventory by scheduling automatic delivery of your order over time. Complete details are available here: <http://www.andovercorp.com/info>

### Payment Terms

Net 30 days from date of invoice for customers with established lines of credit. International customers should check with the sales department to determine if prepayment is required. All foreign orders are subject to shipping and banking fees. For blanket orders, please contact our sales department for special terms and conditions. Visa, MasterCard and American Express accepted.



### Shipping

Most standard items ship within two days of receipt of an order. All out-of-stock products are shipped within two weeks. For rush orders, one-day shipping may be available.

All prices are FOB Salem, New Hampshire, USA. Shipments are freight prepaid and billed to the buyer.

**Order online for free ground shipping within the US.**

### Return Policy

Andover Corporation accepts returns of defective items up to one year from the invoice date. Before returning any items, please contact our technical sales staff for a Return Goods Authorization (RGA) number and complete shipping instructions.

## LIMITED WARRANTY

Andover warrants that all products shall conform to the product specifications and shall be free from defects in materials and workmanship for a period of one year from date of purchase. This Limited Warranty shall not apply in the event of any failure caused by accident, misuse, neglect, alteration or improper installation or repair by the purchaser.

*Disclaimer of other warranties.* The limited warranty set forth above is in place of other warranties, express or implied, and Andover expressly disclaims all other warranties, including warranties of merchantability and fitness for a particular purpose. Specifically, it is the purchaser's responsibility to test and determine the suitability of the products for purchaser's intended use, which shall be the sole responsibility of the purchaser.

*Limitation of remedies and damages.* Andover's sole obligation and the purchaser's sole and exclusive remedy under the Limited Warranty set forth above shall be limited to (a) replacement of defective products provided that written claim of the defect is sent to Andover within the Limited Warranty period, the original product is returned with transportation prepaid, and Andover's inspection establishes the existence of such defect; or (b) at the sole discretion of Andover, return of the original purchase price received by Andover from the purchaser. Andover shall in no event be liable for any damages, including without limitation, lost profits, incidental or consequential damages by reason of or in connection with the purchase or use of the products.

*Indemnification.* The purchaser agrees to indemnify and hold Andover harmless from and against any claim, loss, cost or expense resulting from purchaser's use of the products, whether such claim arises in contract, tort or otherwise.

*Governing law.* All matters arising under this Limited Warranty and other terms and conditions of sale shall be governed by the laws of the State of New Hampshire. The purchaser consents to the exclusive jurisdiction of the courts of the State of New Hampshire in all matters relating to the purchase, sale and use of the products.

# NEUTRAL DENSITY FILTERS

- Provides attenuation with greater linearity over a wide spectral range
- Reduces thermal effects in low-power laser applications
- Delivers superior durability
- Soda lime glass, fused silica, and custom substrates available

## Metallic Coated

Metallic-coated neutral density (ND) filters obtain their optical density from a metal alloy coating on a substrate determined by the wavelength region of interest. Unlike the all-dielectric or absorption type, the metallic type ND filter employs a combination of absorption and reflection to reduce the intensity of light. While able to withstand more incident energy than the absorptive type, metallic ND filters are suitable only for low-power applications. (Note: If used in series, these filters should be tilted to avoid multiple reflections and any reduction of density.)

### GENERAL SPECIFICATIONS

Thickness	1.5 ±0.5mm
Dimensional Tolerances	+0/-0.2mm
Clear Aperture	90% of outside dimension
Surface Quality	60/40 per MIL-0-13830B
Coating Adherence	Per MIL-M-13508C
Humidity	Per MIL-STD-810F
Max. Operating Temperature	+100°C
Substrate Materials	Glass (350–2000nm region) or fused silica (250–2000nm region)
Optical Quality	Glass: Flatness of 3–5 waves per inch and parallelism of 3 arc minutes or better Fused Silica: Flatness of $\lambda/4$ per inch and parallelism of 30 arc seconds or better

### Applications

Machine Vision and Other Imaging Applications  
Scientific Measurements and Research  
Low-Power Lasers  
Calibration  
Attenuation

### METALLIC NEUTRAL DENSITY SPECIFICATIONS

Optical Density	Nominal Transmittance (%)	Transmission Deviation From Nominal (%)		
		250–350nm	350–800nm	800–2000nm
0.10	79.43	±8.0	±2.0	±8.0
0.15	70.79	±7.0	±2.0	±7.0
0.20	63.10	±6.0	±2.0	±6.0
0.30	50.12	±5.0	±2.0	±5.0
0.40	39.81	±4.0	±1.5	±4.0
0.50	31.62	±4.0	±1.5	±4.0
0.60	25.12	±4.0	±1.5	±4.0
0.70	19.95	±4.0	±1.5	±4.0
0.80	15.85	±4.0	±1.5	±4.0
0.90	12.59	±3.5	±1.0	±3.5
1.00	10.00	±3.5	±1.0	±3.5
1.30	5.01	±3.0	±1.0	±3.0
1.50	3.16	±1.5	±0.5	±1.5
2.00	1.00	±0.5	±0.2	±0.5
2.50	0.32	±0.15	±0.07	±0.15
3.00	0.10	±0.06	±0.04	0.01 (nominal)
4.00	0.01	±0.008	±0.1/-0.008	0.01 (nominal)

**VISIBLE/NEAR INFRARED REGION (Glass Substrate, 350–2000nm)**

Optical Density	Nominal Transmittance (%)	Size, Shape & Part Number			
		12.5mm Ø ○	25mm Ø ○	50mm Ø ○	50mm SQ □
0.10	79.43	010FN52-12.5	010FN52-25	010FN52-50	010FN52-50S
0.15	70.79	015FN52-12.5	015FN52-25	015FN52-50	015FN52-50S
0.20	63.10	020FN52-12.5	020FN52-25	020FN52-50	020FN52-50S
0.30	50.12	030FN52-12.5	030FN52-25	030FN52-50	030FN52-50S
0.40	39.81	040FN52-12.5	040FN52-25	040FN52-50	040FN52-50S
0.50	31.62	050FN52-12.5	050FN52-25	050FN52-50	050FN52-50S
0.60	25.12	060FN52-12.5	060FN52-25	060FN52-50	060FN52-50S
0.70	19.95	070FN52-12.5	070FN52-25	070FN52-50	070FN52-50S
0.80	15.85	080FN52-12.5	080FN52-25	080FN52-50	080FN52-50S
0.90	12.59	090FN52-12.5	090FN52-25	090FN52-50	090FN52-50S
1.00	10.00	100FN52-12.5	100FN52-25	100FN52-50	100FN52-50S
1.30	5.01	130FN52-12.5	130FN52-25	130FN52-50	130FN52-50S
1.50	3.16	150FN52-12.5	150FN52-25	150FN52-50	150FN52-50S
2.00	1.00	200FN52-12.5	200FN52-25	200FN52-50	200FN52-50S
2.50	0.32	250FN52-12.5	250FN52-25	250FN52-50	250FN52-50S
3.00	0.10	300FN52-12.5	300FN52-25	300FN52-50	300FN52-50S
4.00	0.01	400FN52-12.5	400FN52-25	400FN52-50	400FN52-50S

**ULTRAVIOLET/VISIBLE/NEAR INFRARED REGION (Fused Silica, 250–2000nm)**

Optical Density	Nominal Transmittance (%)	Size, Shape & Part Number			
		12.5mm Ø ○	25mm Ø ○	50mm Ø ○	50mm SQ □
0.10	79.43	010FN46-12.5	010FN46-25	010FN46-50	010FN46-50S
0.15	70.79	015FN46-12.5	015FN46-25	015FN46-50	015FN46-50S
0.20	63.10	020FN46-12.5	020FN46-25	020FN46-50	020FN46-50S
0.30	50.12	030FN46-12.5	030FN46-25	030FN46-50	030FN46-50S
0.40	39.81	040FN46-12.5	040FN46-25	040FN46-50	040FN46-50S
0.50	31.62	050FN46-12.5	050FN46-25	050FN46-50	050FN46-50S
0.60	25.12	060FN46-12.5	060FN46-25	060FN46-50	060FN46-50S
0.70	19.95	070FN46-12.5	070FN46-25	070FN46-50	070FN46-50S
0.80	15.85	080FN46-12.5	080FN46-25	080FN46-50	080FN46-50S
0.90	12.59	090FN46-12.5	090FN46-25	090FN46-50	090FN46-50S
1.00	10.00	100FN46-12.5	100FN46-25	100FN46-50	100FN46-50S
1.30	5.01	130FN46-12.5	130FN46-25	130FN46-50	130FN46-50S
1.50	3.16	150FN46-12.5	150FN46-25	150FN46-50	150FN46-50S
2.00	1.00	200FN46-12.5	200FN46-25	200FN46-50	200FN46-50S
2.50	0.32	250FN46-12.5	250FN46-25	250FN46-50	250FN46-50S
3.00	0.10	300FN46-12.5	300FN46-25	300FN46-50	300FN46-50S
4.00	0.01	400FN46-12.5	400FN46-25	400FN46-50	400FN46-50S

# NEUTRAL DENSITY FILTERS

## Absorptive

With their ability to minimize back-reflections and scattered light, absorptive neutral density (ND) filters are ideal for calibration. In contrast to the metallic type, absorption-type filters achieve their optical density by absorbing light within the substrate. For this reason, thickness is a key determinant of opacity. Because of their absorbing quality, these filters are suitable for low-power applications only.

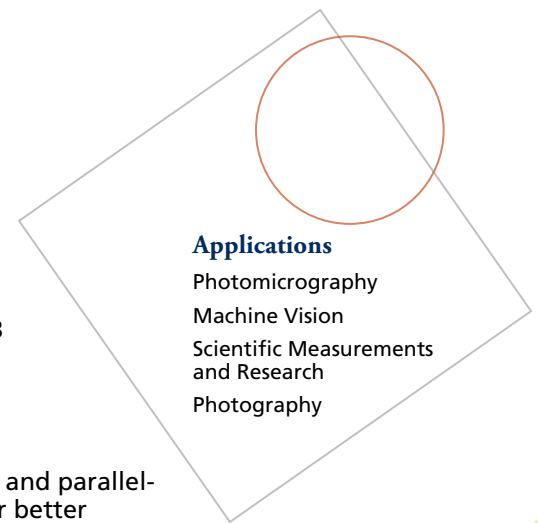
- **Optical density tolerance  $\leq 0.5\%$  from 400nm to 700nm**
- **Sets provide a uniform series of filters for adjusting illumination**
- **Custom substrate materials and dimensions available**

### GENERAL SPECIFICATIONS

Thickness	5.0mm (maximum)
Dimensional Tolerances	$\pm 0.5\text{mm}$
Clear Aperture	90% of diameter
Surface Quality	60/40 per MIL-0-13830B
Max. Operating Temperature	+100°C
Substrate Material	Schott absorption glass
Spectral Range	400–700nm
Optical Quality	Flatness of $\lambda/4$ per inch and parallelism of 30 arc seconds or better

### Applications

Photomicrography  
Machine Vision  
Scientific Measurements and Research  
Photography



Optical Density	Density Tolerance @ 550 nm (%)	Nominal Transmission (%)	Thickness (mm)	Size, Shape & Part Number	
				25mm $\emptyset$ ○	50mm SQ □
0.10	$\pm 10.00$	79.43	3.73	010ABND-25	010ABND-50S
0.20	$\pm 10.00$	63.10	1.53	020ABND-25	020ABND-50S
0.30	$\pm 10.00$	50.12	2.46	030ABND-25	030ABND-50S
0.40	$\pm 10.00$	39.81	3.39	040ABND-25	040ABND-50S
0.50	$\pm 10.00$	31.62	1.91	050ABND-25	050ABND-50S
0.60	$\pm 10.00$	25.12	2.32	060ABND-25	060ABND-50S
0.70	$\pm 10.00$	19.95	2.73	070ABND-25	070ABND-50S
0.80	$\pm 10.00$	15.85	3.13	080ABND-25	080ABND-50S
0.90	$\pm 10.00$	12.59	1.75	090ABND-25	090ABND-50S
1.00	$\pm 10.00$	10.00	1.95	100ABND-25	100ABND-50S
1.50	$\pm 10.00$	3.16	2.96	150ABND-25	150ABND-50S
2.00	$\pm 10.00$	1.00	1.96	200ABND-25	200ABND-50S
3.00	$\pm 10.00$	0.10	2.96	300ABND-25	300ABND-50S
4.00	$\pm 10.00$	0.01	2.84	400ABND-25	400ABND-50S



## NEUTRAL DENSITY SETS

All Andover sets are shipped with a hardwood storage case for protection and convenient storage.



### Metallic-coated Sets

Andover's metallic-coated neutral density filter sets feature both round and square filters in your choice of four sizes and two substrates.

#### 7-PIECE SET

Includes seven filters with optical densities ranging from 0.10 to 4.00, in your choice of four sizes and either glass or fused silica substrates.

0.10  
0.30  
0.50  
1.00  
2.00  
3.00  
4.00

Substrate	Size, Shape & Part Number			
	12.5mmØ ○	25mm Ø ○	50mm Ø ○	50mm SQ □
Glass	128FA52-12.5	128FA52-25	128FA52-50	128FA52-50S
Fused Silica	130FA46-12.5	130FA46-25	130FA46-50	130FA46-50S

#### 17-PIECE SET

Includes 17 filters with optical densities ranging from 0.10 to 4.00, in your choice of four sizes and either glass or fused silica substrates.

0.10 0.90  
0.15 1.00  
0.20 1.30  
0.30 1.50  
0.40 2.00  
0.50 2.50  
0.60 3.00  
0.70 4.00  
0.80

Substrate	Size, Shape & Part Number			
	12.5mmØ ○	25mm Ø ○	50mm Ø ○	50mm SQ □
Glass	132FA52-12.5	132FA52-25	132FA52-50	132FA52-50S
Fused Silica	134FA46-12.5	134FA46-25	134FA46-50	134FA46-50S

### Absorptive Sets

Andover's absorptive neutral density filter sets provide a choice of either round and square filters.

#### 7-PIECE SET

Includes seven filters with optical densities ranging from 0.10 to 4.00.

0.10  
0.30  
0.50  
1.00  
2.00  
3.00  
4.00

Size, Shape & Part Number	
25mm Ø ○	50mm SQ □
135FAND-25	135FAND-50S

#### 14-PIECE SET

Includes 14 filters with optical densities ranging from 0.10 to 4.00.

0.10 0.80  
0.20 0.90  
0.30 1.00  
0.40 1.50  
0.50 2.00  
0.60 3.00  
0.70 4.00

Size, Shape & Part Number	
25mm Ø ○	50mm SQ □
136FAND-25	136FAND-50S

# HARDWOOD STORAGE CASES

- Hardwood construction
- Plated metal hardware
- Custom engraving available



These cases are a great way to store and organize your filters and optics. All cases are made from hardwood, and utilize sturdy plated hinges and clasps. Choose from a variety of case sizes and foam configurations. Custom laser engraving is also available.

## CASES WITH PRE-CUT FOAM INSERTS

Outside dimensions L x W x H (approx.)	Foam configuration accommodates:	Part Numbers
3.75" x 3.75" x 2.75"	Six filters up to 25mm dia.	CASE-6-25
4.75" x 4.75" x 2.75"	Eight filters up to 25mm dia.	CASE-8-25
4.75" x 4.75" x 2.75"	Twelve filters up to 25mm dia.	CASE-12-25
3.75" x 3.75" x 3.5"	Six filters up to 50mm sq.	CASE-6-50
6.75" x 3.75" x 3.5"	Eight filters up to 50mm sq.	CASE-8-50
6.75" x 3.75" x 3.5"	Twelve filters up to 50mm sq.	CASE-12-50

## CASES WITH FOAM BLANKS

Outside dimensions L x W x H (approx.)	Inside dimensions of base L x W x H (approx.)	Part Numbers
3.5" x 3.5" x 1.5"	2.75" x 2.75" x .5"	CASE-2x2
4.75" x 4.75" x 2.5"	4" x 4" x 1.5"	CASE-4x4
6.75" x 6.75" x 2.5"	6" x 6" x 1.5"	CASE-6x6
9.75" x 9.75" x 2.5"	9" x 9" x 1.5"	CASE-9x9