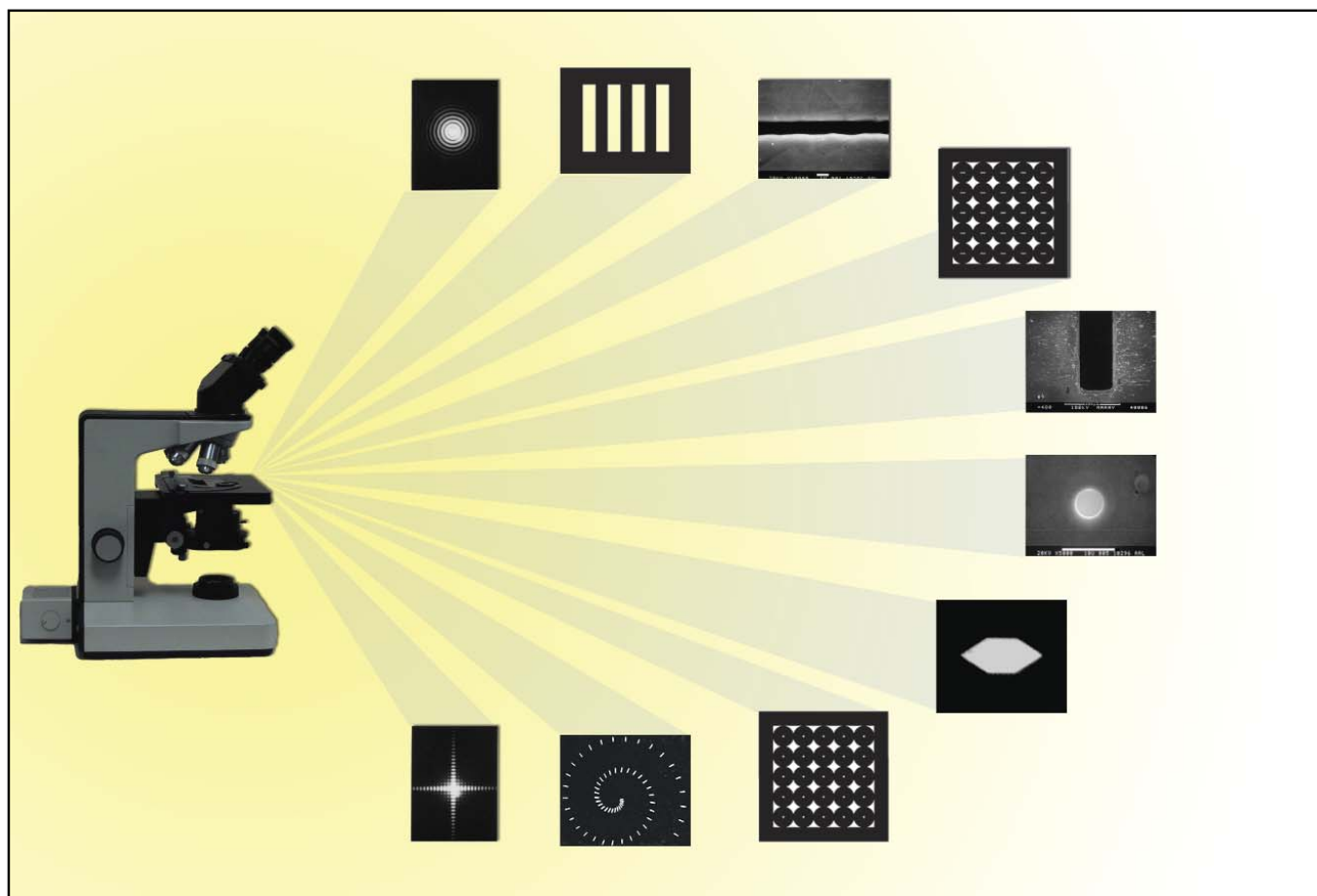




Precision Micro-Aperture Catalog

Version 2013



PLEASE CONTACT:

Dan Gentile

Sales Associate, National Aperture, Inc.

Telephone: (603) 893-7393, (800) 360-4598, Fax: (603) 893-7857

5 NORTHWESTERN DRIVE, SALEM, NH 03079 • EMAIL: dgentile@nationalaperture.com • WEB SITE: <http://www.nationalaperture.com>



PRECISION APERTURES

National Aperture, Inc. is the leading manufacturer of **precision micro-apertures, pinholes, slits, bar patterns and custom configurations.**

Our specialty is **micro-miniature pinholes and slits.**

Standard pinholes range in size from 0.5µm to 1000µm with custom sizes available. Standard slits range in size from 1.0µm to 200µm, with custom sizes available.

High Power pinholes and slits are available as standard items.

All APERTURE EDGES are carefully fabricated employing proprietary computerized micro-drilling, micro-slitting and micro-finishing techniques. All finished components are rigidly quality controlled before shipping. Standards are traceable to NIST.

For special applications, we have provided a choice of options at an additional cost.

Some typical applications of our apertures include:

- spatial filtering,
- high power laser light control,
- gas/liquid flow control,
- spectrometry,
- fiber optics,
- astronomy, etc.

General Quality Specifications:

Results may vary depending on type and thickness of material.
See each Aperture page for Specs.

Certificate of Compliance:

available on request

Basic types:

- Standard precision round apertures
- Standard precision air slit apertures
- High power precision round apertures
- High power precision air slit apertures
- Patterns on dielectric laser coatings

Mounts

See page 7

Pinhole Positioners

See MM-1 and MM-3 Accessories Data sheet

Delivery:

Catalog items including B1 and B2 option, ≤ 3 working days
Unlisted sizes and HS option ≤ 10 working days

Materials

Standard:

- Stainless Steel
- Copper

Optional:

- Nickel
- Brass
- Tantalum
- Tungsten
- Molybdenum
- Gold
- Titanium
- Platinum



precision round Standard

General Specifications:

Finish: Unblackened (see OPTIONS below)

Material: 300 series stainless steel, (except for HS option)

Diameter: 3/8 inch (0.375 inch max.) 9.53mm

Positional tolerance: ϕ .006 inch (0.15mm)

Thickness: 0.0005 inch (12.7 μ m) on holes 5 μ m and up Note: Holes 0.5 μ m to 3.0 μ m, and possibly up to 10 μ m, include the HS option for supported ultra-thin drill region. (0.5 μ m to 3.0 μ m holes are on 0.0001 inch - 0.0002 inch Ni with 0.005 inch thick backer)

Catalog #	Size	Tolerance	Price
1 - 0.5 + HS	0.5 μ m	+0.3 μ m, -0 μ m	\$95.00
1 - 1.0 + HS	1.0 μ m	+0.5 μ m, -0 μ m	\$65.00
1 - 2.0 + HS	2.0 μ m	\pm 0.5 μ m	\$65.00
1 - 3.0 + HS	3.0 μ m	\pm 0.5 μ m	\$65.00
1 - 5.0	5.0 μ m	\pm 1 μ m	\$36.00
1 - 10	10 μ m	\pm 1 μ m	\$36.00
1 - 15	15 μ m	\pm 1.5 μ m	\$28.00
1 - 20	20 μ m	\pm 2 μ m	\$26.00
1 - 25	25 μ m	\pm 2 μ m	\$26.00
1 - 30	30 μ m	\pm 2 μ m	\$26.00
1 - 35	35 μ m	\pm 2 μ m	\$26.00
1 - 40	40 μ m	\pm 3 μ m	\$26.00
1 - 50	50 μ m	\pm 3 μ m	\$26.00
1 - 75	75 μ m	\pm 3 μ m	\$26.00
1 - 100	100 μ m	\pm 4 μ m	\$26.00
1 - 150	150 μ m	\pm 6 μ m	\$26.00
1 - 200	200 μ m	\pm 6 μ m	\$26.00
1 - 300	300 μ m	\pm 8 μ m	\$26.00
1 - 400	400 μ m	\pm 10 μ m	\$24.00
1 - 500	500 μ m	\pm 10 μ m	\$24.00
1 - 600	600 μ m	\pm 10 μ m	\$24.00
1 - 700	700 μ m	\pm 10 μ m	\$24.00
1 - 800	800 μ m	\pm 10 μ m	\$24.00
1 - 900	900 μ m	\pm 10 μ m	\$24.00
1 - 1000	1000 μ m	\pm 10 μ m	\$24.00
1 - "size"	up to 7000 μ m		quote
Unlisted hole size for standard materials:			
One time setup charge + price of nearest hole size			
	6 μ m to 19 μ m		\$75.00
	20 μ m to 1000 μ m		\$55.00
Non-standard substrate or tolerance			
			quote

OPTIONS

ADD'L COST

- B-1** Flat poly black one side, up to 98% emissivity in visible and near IR. Available on holes over 5 μ m. \$15.00
- B-2** Oxide, dull black, both sides on 5.0 μ m and up \$15.00
- HS** Extra-heavy substrate, 0.005 inch (0.127mm) thick thinned down to required Ni thickness (included with 0.5 μ m - 3.0 μ m apertures).
Unlisted Size \$40.00



- CT** Closer Tolerance; half of listed tolerance,
5 μ m to 15 μ m \$45.00
Unlisted Size \$75.00
20 μ m and up \$25.00
Unlisted Size \$45.00
- C** Calibrated; actual size \pm 0.5 μ m or 1% \$20.00

M-(size) Mounted; See page 7 for Mounting selection and price

General Quality Standards for Round Apertures:

Roundness: Major Axis - Minor Axis, max.

- 0.5 μ m on holes 1-15 μ m
- 1. μ m on holes 20-50 μ m
- 2.0 μ m on holes 100 μ m and up

Finish: Optical research quality

- <20 μ -inch on holes 5 μ m to 30 μ m
- 30 to 40 μ -inch on holes 31 μ m to 100 μ m
- 40 to 80 μ -inch on holes over 100 μ m

Ordering Information Example;

25 μ m round, black 2 sides, mounted on 25mm disc.

Cat no.: **1-25+B-2+M**

The information contained in this data sheet is subject to change without notice. Critical dimensions or specifications should be verified with our technical support staff.



precision air slit

Standard

General Specifications:

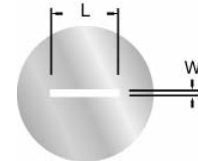
Finish: Unblackened (see OPTIONS below)

Material: 300 series stainless steel, (except for HS option)

Diameter: 3/8 inch (0.375 inch max.) 9.53mm

Positional tolerance: ϕ .006 inch (0.15mm)

Thickness: 0.0005 inch (12.7 μ m) on slits 5 μ m and up Note: 3 μ m and under includes a 0.005 inch thick support with a 2 μ m to 5 μ m thin Ni slit region.



Catalog #	Slit Width (μ m)	Tolerance	Length =	Price
2 - 1 - 1 + HS	1.0 μ m	+0.5 μ m, -0 μ m	1 mm	\$250.00
2 - 2.5 - 3 + HS	2.5 μ m	+1 μ m, -0.5 μ m	3 mm	\$95.00
2 - 5 - 3	5 μ m	\pm 1 μ m	3 mm	\$55.00
2 - 10 - 3	10 μ m	\pm 1 μ m	3 mm	\$55.00
2 - 25 - 3	25 μ m	\pm 2 μ m	3 mm	\$45.00
2 - 50 - 3	50 μ m	\pm 2 μ m	3 mm	\$45.00
2 - 100 - 3	100 μ m	\pm 4 μ m	3 mm	\$45.00
2 - 150 - 3	150 μ m	\pm 4 μ m	3 mm	\$45.00
2 - 200 - 3	200 μ m	\pm 4 μ m	3 mm	\$45.00

	Width Range	Set-Up
For non-standard lengths up to 7.5mm: unlisted unit price per quote + setup shown	6 μ m to 23 μ m	\$95.00 per size
	26 μ m to 750 μ m	\$50.00 one time charge per order
Custom	Non-standard substrate or tolerance:	quote

OPTIONS	ADD'L COST
B-1 Flat poly black one side, up to 98% emissivity in visible and near IR. Available on slits over 5 μ m.	15.00
B-2 Oxide, dull black, both sides, 5 μ m and up	15.00
HS Extra-heavy substrate, 0.005 inch (0.127mm thick, thinned down to required Ni thickness and with 0.047 inch orientation notch. (included with 1-2 μ m slits. Maximum slit length: 5mm).	40.00
CT Closer Tolerance; half of listed tolerance,	
25 μ m to 50 μ m	60.00
Unlisted Size	85.00
100 μ m and up	25.00
Unlisted Width	45.00
Unlisted Lengths quoted on request	
C Calibrated; actual size \pm 1 μ m or 1%	45.00
M-(size) Mounted; See page 7 for Mounting selection and price	

General Quality Standards for Slit Apertures:

Edge Finish: 40 μ -inch <0.0006 inch thick

60 μ -inch 0.001 inch thick

Straightness: <0.5 μ m/mm, <2.0 μ m/inch

Ordering Information Example;

25 μ m air slit, 3mm long, black one side, calibrated.

Cat no.: **2-25+B-1+C**

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precision round High Power

General Specifications:

Finish: Gold plated one side, flat poly black one side, up to 98% emissivity in visible and near IR.
(see OPTIONS below)

Material: Copper

Diameter: 3/8 inch (0.375 inch maximum), 9.53mm

Positional tolerance: ϕ .006 inch (0.1524mm)

Thickness: 0.001 inch (25 μ m)



Catalog #	Size	Tolerance	Price
3 - 5	5 μ m	$\pm 1\mu$ m	\$60.00
3 - 10	10 μ m	$\pm 1\mu$ m	\$60.00
3 - 15	15 μ m	$\pm 1.5\mu$ m	\$60.00
3 - 25	25 μ m	$\pm 2\mu$ m	\$60.00
3 - 50	50 μ m	$\pm 3\mu$ m	\$60.00
3 - 100	100 μ m	$\pm 4\mu$ m	\$60.00
3 - 200	200 μ m	$\pm 6\mu$ m	\$60.00
3 - "size"	>200 μ m and \leq 7000 μ m		quote

Unlisted hole size for standard materials: One time setup charge + price of nearest hole size

	6 μ m to 19 μ m	\$75.00
	20 μ m to 1000 μ m	\$55.00
Non-standard substrate or tolerance		quote

OPTIONS	ADD'L COST
HS Extra-heavy substrate; 0.004 inch (0.1016mm) thick thinned down to 0.001 inch Cu thickness. 5 μ m to 15 μ m	\$40.00 . . .
Unlisted Size	\$75.00
20 μ m to 1000 μ m	\$30.00
Unlisted Size	\$50.00
G2 Gold plated both sides	\$20.00
Note: Listed sizes and unlisted sizes will be charged a setup and get normal delivery. Standby status for listed sizes will eliminate setup cost, but can add up to 4 weeks to delivery time.	
CT Closer Tolerance; half of listed tolerance, 5 μ m to 15 μ m	\$75.00
Unlisted Size	\$95.00
20 μ m and up	\$35.00
Unlisted Size	\$65.00
C Calibrated; actual size \pm 0.5 μ m or 1% (5 μ m and up)	\$20.00
M-(size) Mounted; See page 7 for Mounting selection and price	

Power Resistance Examples:

0.5 to 1 megawatt/mm², 75 nanosecond duration, 700nm
1 to 2 megawatt/mm², 10 nanosecond duration, 700nm

Note: Because of numerous power density conditions, a test on 1 mil Cu in your direct operating environment is recommended.

General Quality Standards for Round Apertures:

Roundness: Major Axis - Minor Axis, max.

0.5 μ m on holes 1-15 μ m

1.0 μ m on holes 20-50 μ m

2.0 μ m on holes 100 μ m and up

Finish: Optical research quality

<20 μ -inch on holes 5 μ m to 30 μ m

30 to 40 μ -inch on holes 31 μ m to 100 μ m

40 to 80 μ -inch on holes over 100 μ m

Ordering Information Example:

25 μ m high power round, mounted on 25mm disc.

Cat no.: **3-25+M-25**

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precision air slit

High Power

General Specifications:

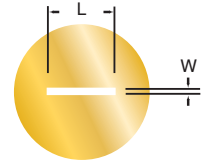
Finish: Gold plated one side, flat poly black one side, up to 98% emissivity in visible and near IR.
(see OPTIONS below)

Material: Copper

Diameter: 3/8 inch (0.375 inch maximum), 9.53mm

Positional tolerance: ϕ .006 inch (0.1524mm)

Thickness: 0.001 inch (25 μ m)



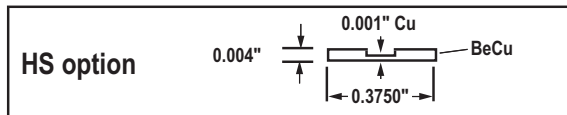
High Power

Catalog #	Tolerance	Slit Width (μ m)	Length =	Price
4 - 5 - 3	$\pm 1\mu$ m	5 μ m	3 mm	\$85.00
4 - 10 - 3	$\pm 1\mu$ m	10 μ m	3 mm	\$85.00
4 - 25 - 3	$\pm 2\mu$ m	25 μ m	3 mm	\$75.00
4 - 50 - 3	$\pm 3\mu$ m	50 μ m	3 mm	\$75.00
4 - 100 - 3	$\pm 4\mu$ m	100 μ m	3 mm	\$75.00
4 - 200 - 3	$\pm 4\mu$ m	200 μ m	3 mm	\$75.00
			Width Range	Set-Up
For non-standard lengths up to 7.5mm:			6 μ m to 24 μ m	per size: \$95.00
unlisted unit price per quote + setup shown			26 μ m to 750 μ m	one time charge per order: \$50.00
Custom	Non-standard substrate or tolerance:			quote

OPTIONS

ADD'L COST

HS Extra-heavy substrate, 0.004 inch (0.1016mm) thick thinned down to 0.001 inch Cu thickness.	
5 μ m to 20 μ m	\$65.00
Unlisted Size	\$75.00
25 μ m to 750 μ m	\$45.00
Unlisted Size	\$50.00



G2 Gold plated both sides	\$20.00
CT Closer Tolerance; half of listed tolerance, 25 μ m to 50 μ m	\$85.00
Unlisted Size	\$95.00
100 μ m to 1000 μ m	\$35.00
Unlisted Size	\$65.00
Longer lengths quoted on request	
C Calibrated; actual size $\pm 1\mu$ m or 1% (25 μ m and up, average of end-center-end)	\$45.00

M-(size) Mounted; See page 7 for Mounting selection and price

Power Resistance Examples:

0.5 to 1 megawatt/mm², 75 nanosecond duration, 700nm

1 to 2 megawatt/mm², 10 nanosecond duration, 700nm

Note: Because of the numerous power density condition a test on 1 mil Cu in your direct operating environments is recommended.

General Quality Standards for Slit Apertures:

Edge Finish: 60 μ -inch 0.001 inch thick

Straightness: <0.5 μ m/mm,
<2.0 μ m/inch

Ordering Information Example;

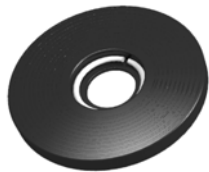
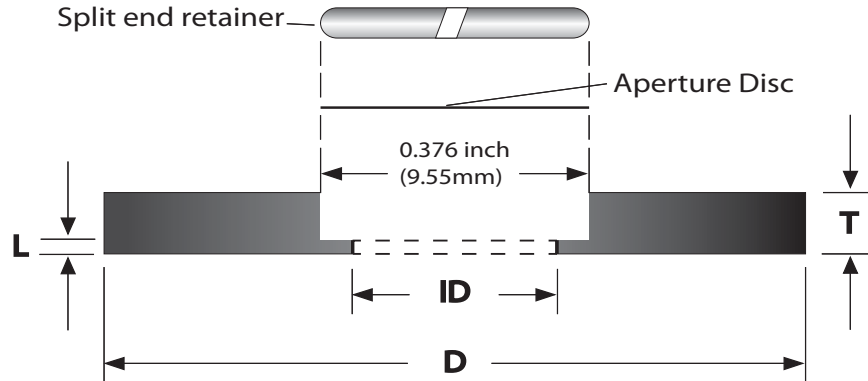
25 μ m air slit 3mm long (4-25), calibrated (C)

The part number would be **4-25-3+C**

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Aperture Mounts



M-25 25mm diameter blackened aluminum mount

\$20.00

D = 24.95mm
T = 2.54mm
ID = 7.3mm
L = 0.63mm



M-18 18mm diameter blackened aluminum mount

\$20.00

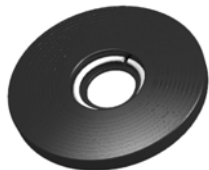
D = 17.95mm
T = 2.54mm
ID = 7.3mm
L = 0.63mm



M-16 16mm diameter blackened aluminum mount

\$20.00

D = 15.95mm
T = 1.8mm
ID = 4.0mm
L = 0.46mm



M-1 1.0 inch diameter blackened aluminum mount

\$20.00

D = 0.998 inch
T = 0.100 inch
ID = 0.290 inch
L = 0.025 inch



M-0.5 0.5 inch diameter blackened aluminum mount

\$20.00

D = 0.498 inch
T = 0.055 inch
ID = 0.290 inch
L = 0.018 inch

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slits and round

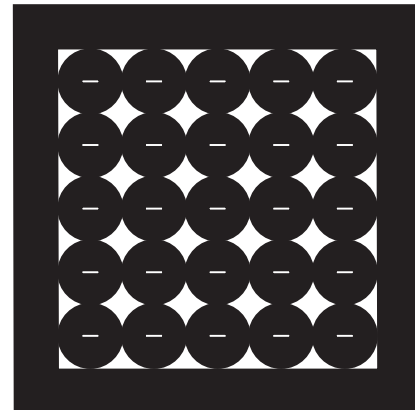
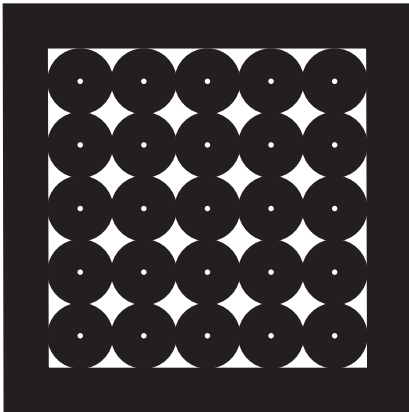
High Quality
Palettized Precision APERTURES
For Volume Applications

New

Pinholes



Slits



Custom and Stock Palettes

- Highly competitive on **pricing** and **quality** with Lithography and Etching
- **Volume** pricing on 500 pc. quantity and up
- Low NRE charges
- Features easily modifiable (post NRE)
- Highly competitive **delivery**
- Top quality feature interior **finish**

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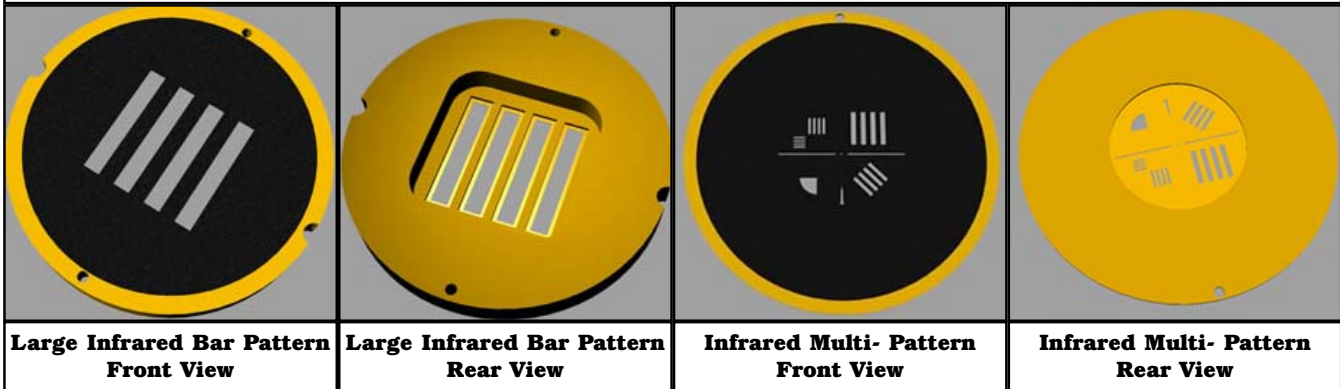


National Aperture, Inc.

**Custom Patterns
for Infrared Applications
Made to Customer Specifications**

Infrared

New



National Aperture, Inc. has been the leader in the military and industrial market for **precise, highly demanding** Infrared Apertures and Infrared Patterns requiring **high infrared emissivity**, in conjunction with **high reflectance**.

Competitive with:

- EDM
- Laser Machining
- Conventional Machining
- Micro-machining
- Etching
- Photo Lithography ...

Applications include:

- Infrared Calibration
- Infrared Resolution
- Infrared Imaging

Patterns include:

- 4 bar or other multi-bar
- Quarter round,
- Half round, etc.
- Cross target patterns
- Squares
- Slit and hole combinations
- Arrays, Random patterns, etc.

Standard Backer Option:

0.025-0.37 inch thick Aluminum, Brass or Copper

Available Coatings:

- Gold (bright or matte)
- Nextel™
- Aeroglaze™
- Poly black
- Krylon
- Textured Krylon
- Per customer request

Emissivity Data:

Available from 1μm to 16μm wavelength

Size Range:

- Slits and holes 10μm to >50mm
- Bar Patterns 17μm to >50mm

Edge Quality:

0.7μm to 3.0μm (depending on requirements)

Standard Certifications:

Available down to +/- 2μm

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spatial filter

New

High Quality Spatial Filter APERTURES

FITS MOST STANDARD SPATIAL FILTERS

Specifications

Substrate:

Material: 300 series stainless steel
Substrate Diameter: 3/8 inch (0.375 inch), 9.53mm
Thickness: 0.0005 inch (12.7µm)
Finish: Black both sides

Mount:

Thickness: 0.1 inch
Diameter: 1 inch
Aperture Tolerance: ø.006 inch (0.1524mm)



Catalog #	Size (µm)	Tolerance	Price Ea. \$
SP-5	5.0µm	± 1µm	63.00
SP-10	10µm	± 1µm	60.00
SP-15	15µm	± 1.5µm	59.00
SP-25	25µm	± 2µm	59.00
SP-35	35µm	± 2µm	59.00
SP-50	50µm	± 3µm	59.00
SP-75	75µm	± 3µm	59.00
SP-100	100µm	± 4µm	59.00
SP-150	150µm	± 6µm	59.00
SP-200	200µm	± 6µm	59.00

SPATIAL FILTER HIGH POWER PINHOLES

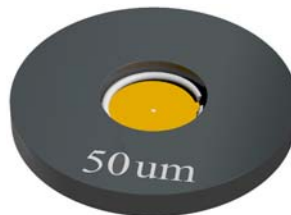
Specifications

Substrate:

Material: Copper
Substrate Diameter: 3/8 inch (0.375 inch), 9.53mm
Thickness: 0.001 inch (25.4µm)
Finish: Black one side/
Gold one side

Mount:

Thickness: 0.1 inch
Diameter: 1 inch
Aperture Tolerance: ø.006 inch (0.1524mm)



Catalog #	Size (µm)	Tolerance	Price Ea. \$
SPHP-5	5.0µm	± 1µm	85.00
SPHP-10	10µm	± 1µm	85.00
SPHP-15	15µm	± 1.5µm	85.00
SPHP-50	50µm	± 3µm	80.00
SPHP-100	100µm	± 4µm	80.00
SPHP-150	150µm	± 6µm	74.00
SPHP-200	200µm	± 6µm	74.00

SPATIAL FILTERS FIXED SLITS

Specifications

Substrate:

Material: 300 series stainless steel
Substrate Diameter: 3/8 inch (0.375 inch), 9.53mm
Thickness: 0.0005 inch (12.7µm)
Finish: Black both sides
Slit Length: = 3.0 mm

Mount:

Thickness: 0.1 inch
Diameter: 1 inch
Aperture Tolerance: ø.006 inch (0.1524mm)



Catalog #	Size (µm)	Tolerance	Price Ea. \$
SS-5	5.0µm	± 1µm	75.00
SS-10	10µm	± 1µm	75.00
SS-15	15µm	± 1.5µm	75.00
SS-25	25µm	± 2µm	72.00
SS-50	50µm	± 3µm	72.00
SS-100	100µm	± 4µm	69.00
SS-200	200µm	± 4µm	69.00

We are the manufacturer

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Apertures on Chrome/Aluminum/Gold Coated Glass First Surface Mirrors

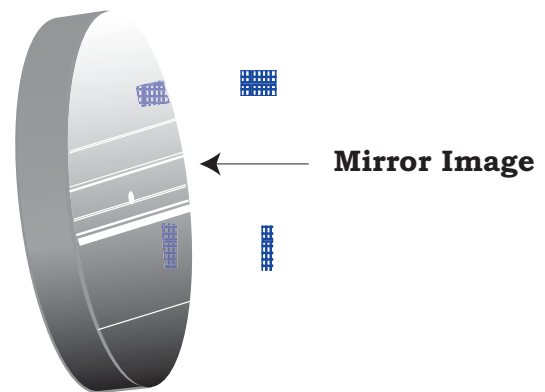
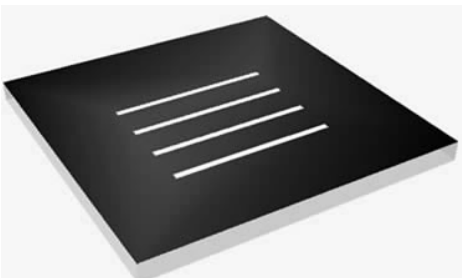
Custom Only

LOW SETUP COSTS compared to conventional reticle artwork

Darkfield only

Patterns: small holes preferably less than 100µm and narrow slits, preferably less than 50µm wide, any length

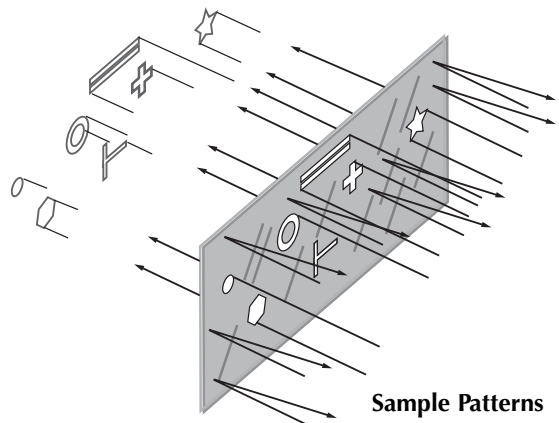
Substrate: Edmund Optics Tech Spec™ or Commercial Quality, or other suitable first surface mirror, per customer choice



Clear Patterns, Reticles, Apertures on high power dielectric laser reflector coatings

For applications requiring transparency and/or power resistance greater than achievable with opaque (metallic, etc.) surfaces this process creates patterns on dichroic reflectors with selective transparency.

Wavelength:	Per standard high power dielectric coating, visible and near visible
Reflectivity:	20% to 98%, based on requirement
Incidence:	0° - 90°, per specification
Power resistance:	2 - 8 Megawatts/mm ² , pulsed
Pattern definition:	< 1 µm (semiconductor pattern quality)
Material:	Glass, fused silica, etc.
Dimensions:	Up to 6 inch (152.4mm) thickness, 0.04 inch (1.016mm) - 0.09 inch (2.286mm)
Pattern generation:	Per customer or National Aperture, Inc. via AutoCad™
Pricing:	Quote



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shapes/patterns

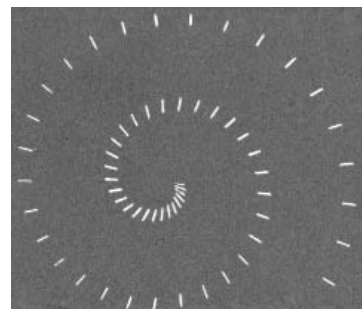
Custom

Typical materials:

- Stainless steel
- Brass
- Copper
- Gold
- Nickel
- Tantalum
- Tungsten
- Molybdenum
- Titanium
- Platinum
- etc.

Suggested materials (unless otherwise required):

For best quality and cost;
300 series stainless steel 0.001 inch thick or under.



Spiral Slits

Gas, Liquid, Material FLOW Oriented:

Leak test grade;

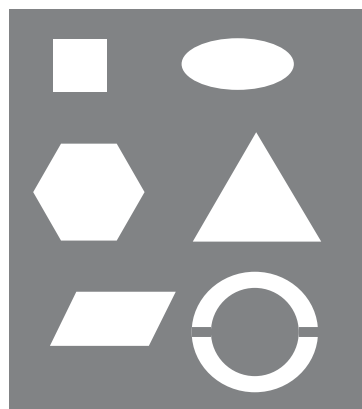
The emphasis normally on roundness is replaced by orifice area specification to improve cost effectiveness. To optimize quality, materials should be kept as thin as allowable. 302 stainless steel is suggested unless otherwise required.

Metered Flow;

Same as Leak Test above

Dies (wire polymer), Jets (liquid or gas);

Up to 0.010 inch (0.254mm) diameter x 0.010 inch (0.0245mm) deep



Shapes

X-ray shielding, selective:

Typical materials are tantalum, tungsten and platinum

Special Micro Patterns:

Round, square, rectangular, slit, arc, hexagon, octagon, annular, etc. and combinations of patterns or arraysper quote

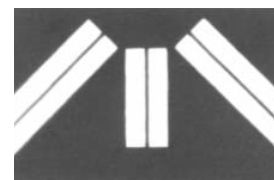
Four-Bar Patterns:

Standard or 302 stainless steel 0.0005 in. x 0.375 in., or copper 0.001 in.
Up to 5mm square; not including applicable air slit options\$85.00
Up to 0.750 in., any workable materialper quote

SEM photos:

per feature\$95.00
per additional shot/angle\$25.00
(Not to be used for calibration or measurement.)

Quality projection samples are available at minimal or no cost.



Slits

The information contained in this data sheet is subject to change without notice. Critical dimensions or specifications should be verified with our technical support staff.

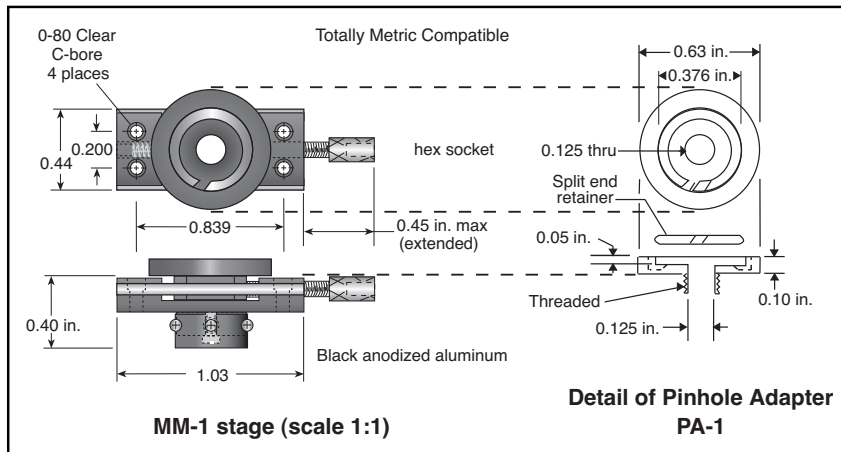
Accessories

Model MM-1XY/PA

The pinhole (aperture) positioner is a composite of the MM-1 MicroMini™ stage and the PA-1 pinhole adapter.

Specifications:

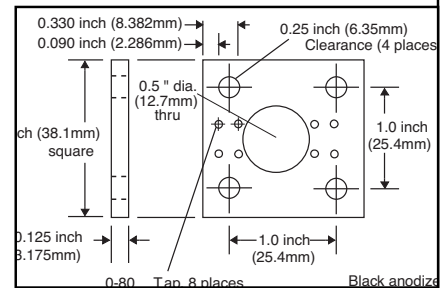
Travel:	0.125 inch, X and Y
Screw Pitch:	80 TPI
Sensitivity:	0.5µm
Backlash:	0 (no ball bearings)
Wobble (max):	10 µrad
Weight:	8g



Accessories

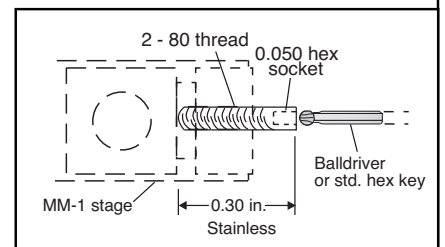
AP4-1 Adapter Plate

A multi-position mounting plate to interface with standard optical tables and accessories, or to stabilize free-standing stages.



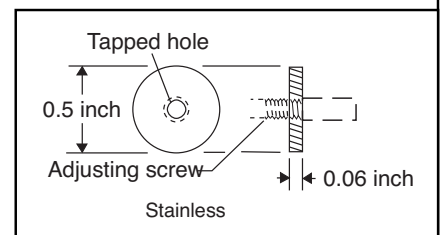
SS-1 Headless Adjusting Screw

This custom designed lead screw replaces the standard thumb screw. It provides full linear travel, while reducing the overall length of the stage by 0.4 inches.



TG-1 Thumb Grip

This knurled 1/2 in. diameter adjustment ring provides increased sensitivity. The TG-1 can be added to the standard MM-1 adjusting screw and may alternately be used as a locking nut.



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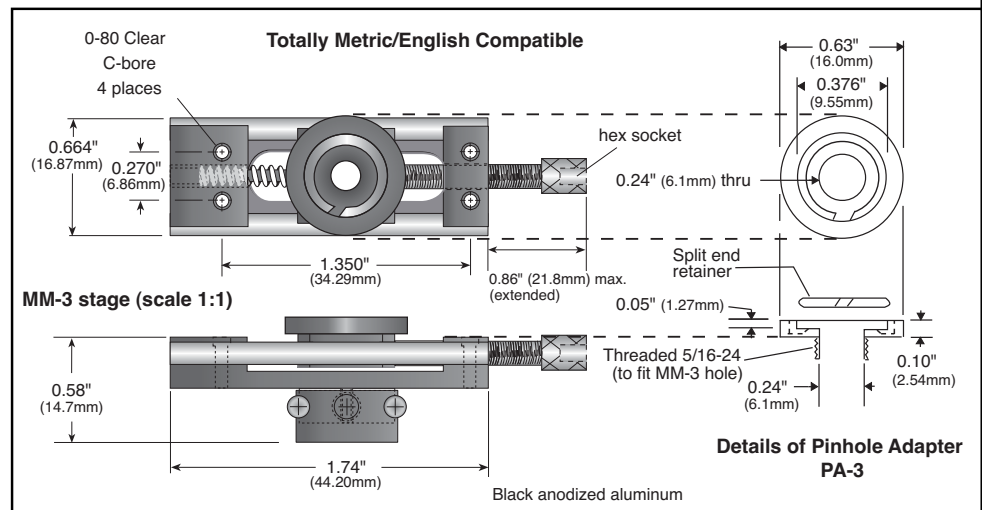
Accessories

Model MM-3XY/PA

The pinhole (aperture) positioner is a composite of the MM-3 MicroMini™ stage and the PA-1 pinhole adapter.

Specifications:

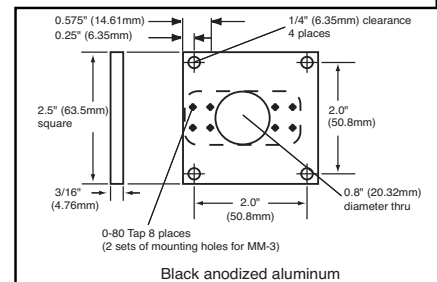
Travel:	0.5 inch, X and Y
Screw Pitch:	80 TPI
Sensitivity:	0.5 μ m
Backlash:	0 (no ball bearings)
Wobble:	10 μ rad
Weight:	35g



Accessories

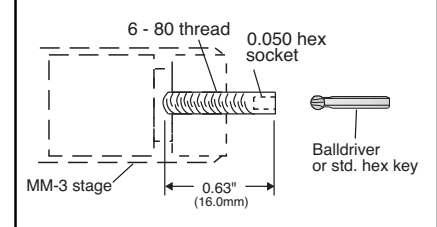
AP4-3 Adapter Plate

A multi-position mounting plate to interface with standard optical tables and accessories, or to stabilize free-standing stages.



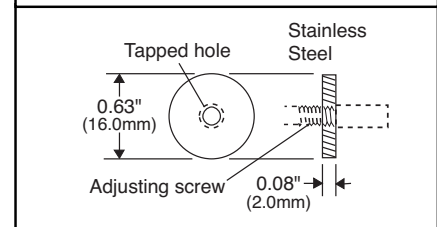
SS-3 Headless Adjusting Screw

This custom designed stainless lead screw replaces the standard thumb screw, and provides full linear travel while reducing the overall length of the stage by 0.5 inches.



TG-3 Thumb Grip

The knurled 5/8 inch diameter adjustment ring provides increased sensitivity. The TG-3 can be added to the standard MM-3 adjusting screw and may alternately be used as a locking nut.



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