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THORLABS

R1CA800 - June 3, 2019

Item # R1CA800 was discontinued on June 3, 2019. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

ANNULAR APERTURE OBSTRUCTION TARGETS

- **Obstruction Diameters Ranging from 42.5 µm to 1700 µm**
- **Pinhole Diameters Ranging from 50 µm to 2000 µm**
- **Blocking Region with Optical Density ≥ 6**
- **0.5 mm Thick Quartz Substrate in Ø1" Aluminum Housing**

R1DF500
Annular Aperture Target
Obstruction Diameter = 500 µm
Pinhole Diameter = 1000 µm

Application Idea
R1CA2000 Obstructio
Target Mounted in
CXY1Q Translation Mou
with Quick-Release Plate

Hide Overview

OVERVIEW

Features

- Increase Contrast when Imaging Biological Systems
- Filter Out Lower Order Spatial Modes
- 0.5 mm Thick Quartz Substrate
- Blocking Region (OD ≥ 6) Created Using a Chrome Mask
- AR Coating Over Chrome Mask to Minimize Back Reflections
- Aluminum Housing with a 1" Outer Diameter

Thorlabs' Annular Aperture Obstruction Targets (AAOTs) are ideal for increasing the contrast when imaging biological systems or filtering out lower order modes. Each AAOT is characterized by the ratio (ε) between the obstruction diameter (OD) and the pinhole diameter (PD). Thorlabs offers Annulus Aperture targets that are designed with either a constant 1 mm pinhole diameter for high-pass spatial filtering applications, or a constant ε ratio for confocal microscopy applications.

They are fabricated from 0.5 mm thick quartz glass substrate that has high transmission in the 400 - 2200 nm wavelength range. The clear aperture annulus is created using a chrome mask with an optical density ≥ 6 that blocks light from being transmiitted though the inner obstruction target and outer obstruction region. The AAOT is then mounted within a housing that has a 1" outer diameter for mounting within our translation mounts for Ø1" optics, as shown in the image above. The glass substrate is mounted with the chrome mask facing towards the engraved side of the housing. To minimize back reflections, we recommend having the AR-coated chrome mask facing the light souce when used.

Hide Obstruction Targets: Annular Aperture, Ratios from 0.05 to 0.50

Obstruction Targets: Annular Aperture, Ratios from 0.05 to 0.50

- Constant Pinhole Diameter of 1 mm
- Obstruction Diameters Range from 50 µm to 500 µm
- Ø1" Housing can be Mounted in Many of our Translation Mounts for Fine Alignment
- Ideal for High-Pass Spatial Filtering Applications
- Can be Used in Our Pre-Assembled Spatial Filter System

$$\varepsilon = \frac{Obstruction\ Diameter}{Pinhole\ Diameter}$$

Click to Enlarge
Close-Up Photo of an Obstruction Pinhole
OD: Obstruction Diameter
PD: Pinhole Diameter

These Annular Aperture Obstruction Targets have an obstruction-to-pinhole ratio (ε) between 0.05 and 0.50, making them ideal for use as high-pass or edge-enhancement filters. When the Fourier plane is imaged onto the filter, the center region, which contains Gaussian light (TEM_{00}), will become blocked by the center obstruction. This allows the higher order modes of the Fourier plane, which contain diffraction information, to pass through and form the image. This will cause an overall loss of light intensity and generalized, smooth features, but it will enhance any sharp lines or boundaries.

Shown to the right is a close up photo of an obstruction pinhole with the pinhole diameter (PD) and obstruction diameter (OD) labeled. The chrome-masked area appears black, and light is transmitted through the clear aperture.

Item #	ε Ratio[a]	Obstruction Diameter	Pinhole Diameter	Annular Aperture Concentricity		Glass Thickness
				with Respect to Housing[b]	with Respect to Substrate[c]	
R1DF50	0.05	50 µm	1 mm	<0.41 mm	≤216 µm	0.5 mm
R1DF100	0.10	100 µm				
R1DF150	0.15	150 µm				
R1DF200	0.20	200 µm				
R1DF250	0.25	250 µm				
R1DF300	0.30	300 µm				
R1DF400	0.40	400 µm				
R1DF500	0.50	500 µm				

a. Ratio of the Obstruction Diameter to the Pinhole Diameter (See Photo to the Above Right)
b. Concentricity of the Annulus with Respect to the Outer Diameter of the Quartz Glass Substrate
c. Concentricity of the Annulus with Respect to the Outer Diameter of the Aluminum Housing

Part Number	Description	Price	Availability
R1DF50	Customer Inspired! Annular Obstruction Target, ε = 0.05, Ø50 µm Obstruction	$160.74	Today
R1DF100	Customer Inspired! Annular Obstruction Target, ε = 0.10, Ø100 µm Obstruction	$160.74	Today
R1DF150	Customer Inspired! Annular Obstruction Target, ε = 0.15, Ø150 µm Obstruction	$160.74	Today
R1DF200	Customer Inspired! Annular Obstruction Target, ε = 0.20, Ø200 µm Obstruction	$160.74	Today
R1DF250	Customer Inspired! Annular Obstruction Target, ε = 0.25, Ø250 µm Obstruction	$160.74	Lead Time
R1DF300	Customer Inspired! Annular Obstruction Target, ε = 0.30, Ø300 µm Obstruction	$160.74	Today
R1DF400	Customer Inspired! Annular Obstruction Target, ε = 0.40, Ø400 µm Obstruction	$160.74	Lead Time
R1DF500	Customer Inspired! Annular Obstruction Target, ε = 0.50, Ø500 µm Obstruction	$160.74	Today

Hide Obstruction Targets: Annular Aperture, 0.85 Ratio

Obstruction Targets: Annular Aperture, 0.85 Ratio

- Constant ε Ratio of 0.85
- Ø1" Housing can be Mounted in Many of our Translation Mounts for Fine Alignment
- Ideal for Confocal Microscopy Applications
- Can be Used in Our Pre-Assembled Spatial Filter System

$$\varepsilon = \frac{Obstruction\ Diameter}{Pinhole\ Diameter}$$

Click to Enlarge
Close-Up Photo of an

These Annular Aperture Obstruction Targets have a constant obstruction-to-pinhole ratio (ε) of 0.85, making them ideal for increasing the

lateral spatial resolution within confocal imaging systems. These filters are designed to be placed directly in front of the output of a light source such as a fiber-coupled laser. The system should be aligned so that the first bright diffraction spot of the light source is larger than the pinhole diameter of the annular aperture.

Obstruction Pinhole
OD: Obstruction Diameter
PD: Pinhole Diameter

These annular apertures are often used in confocal and two-photon excitation microscopy to increase the lateral resolution of the imaging system or in confocal theta fluorescence microscopy to increase the lateral and axial resolution of the imaging system.

Shown to the right is a close up photo of an obstruction pinhole with the pinhole diameter (PD) and obstruction diameter (OD) labeled. The chrome-masked area appears black, and light is transmitted through the clear aperture.

Item #	ε Ratio[a]	Obstruction Diameter	Pinhole Diameter	Concentricity		Glass Thickness
				with Respect to Housing[b]	with Respect to Substrate[c]	
R1CA50	0.85	42.5 µm	50 µm	<0.41 mm	≤216 µm	0.5 mm
R1CA100		85 µm	100 µm			
R1CA200		170 µm	200 µm			
R1CA300		255 µm	300 µm			
R1CA500		425 µm	500 µm			
R1CA800		680 µm	800 µm			
R1CA1000		850 µm	1000 µm			
R1CA2000		1700 µm	2000 µm			

a. Ratio of the Obstruction Diameter to the Pinhole Diameter (See Photo to the Above Right)
b. Concentricity of the Annulus with Respect to the Outer Diameter of the Quartz Glass Substrate
c. Concentricity of the Annulus with Respect to the Outer Diameter of the Aluminum Housing

Part Number	Description	Price	Availability
R1CA50	Customer Inspired! Annular Obstruction Target, ε = 0.85, Ø42.5 µm Obstruction	$160.74	Today
R1CA100	Customer Inspired! Annular Obstruction Target, ε = 0.85, Ø85 µm Obstruction	$160.74	Today
R1CA300	Customer Inspired! Annular Obstruction Target, ε = 0.85, Ø255 µm Obstruction	$160.74	Today
R1CA500	Customer Inspired! Annular Obstruction Target, ε = 0.85, Ø425 µm Obstruction	$160.74	Today
R1CA800	Customer Inspired! Annular Obstruction Target, ε = 0.85, Ø680 µm Obstruction	$160.74	Lead Time
R1CA1000	Customer Inspired! Annular Obstruction Target, ε = 0.85, Ø850 µm Obstruction	$160.74	Today
R1CA2000	Customer Inspired! Annular Obstruction Target, ε = 0.85, Ø1700 µm Obstruction	$160.74	5-8 Days