



THORLABS

R1DF150 - JUN 5, 2019

Item # R1DF150 was discontinued on JUN 5, 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 $\varnothing 1$ " Aluminum Housing



R1DF200
Annular Aperture Target
Obstruction Diameter = 200 μm
Pinhole Diameter = 1000 μm

Application Ideas
R1CA2000 Obstruction
Target Mounted in
CXY1Q Translation Mount
with Quick-Release Plate



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

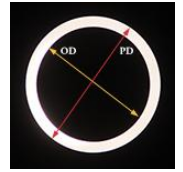
Thorlabs' Annular Aperture Obstruction Targets (AAOTs) are ideal for increasing the contrast when imaging biological systems or filtering out lower order modes. Each AAOT is characterized by the ratio (ϵ) between the obstruction diameter (OD) and the pinhole diameter (PD). Thorlabs offers Annulus Aperture 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 transmitted through 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 $\varnothing 1$ " 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 source when used.

Obstruction Targets: Annular Aperture, Ratios from 0.05 to 0.40

- ▶ Constant Pinhole Diameter of 1 mm
- ▶ Obstruction Diameters Range from 50 μm to 400 μm
- ▶ $\emptyset 1$ " 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

$$\epsilon = \frac{\text{Obstruction Diameter}}{\text{Pinhole Diameter}}$$



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 0.40, 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	$\leq 216 \mu\text{m}$	0.5 mm
R1DF100	0.10	100 μm				
R1DF150	0.15	150 μm				
R1DF200	0.20	200 μm				
R1DF300	0.30	300 μm				
R1DF400	0.40	400 μm				

- Ratio of the Obstruction Diameter to the Pinhole Diameter (See Photo to the Above Right)
- Concentricity of the Annulus with Respect to the Outer Diameter of the Quartz Glass Substrate
- 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, $\epsilon = 0.05$, $\emptyset 50 \mu\text{m}$ Obstruction	\$160.74	Today
R1DF100	Customer Inspired! Annular Obstruction Target, $\epsilon = 0.10$, $\emptyset 100 \mu\text{m}$ Obstruction	\$160.74	Today
R1DF150	Customer Inspired! Annular Obstruction Target, $\epsilon = 0.15$, $\emptyset 150 \mu\text{m}$ Obstruction	\$160.74	Today
R1DF200	Customer Inspired! Annular Obstruction Target, $\epsilon = 0.20$, $\emptyset 200 \mu\text{m}$ Obstruction	\$160.74	Today
R1DF300	Customer Inspired! Annular Obstruction Target, $\epsilon = 0.30$, $\emptyset 300 \mu\text{m}$ Obstruction	\$160.74	Today
R1DF400	Customer Inspired! Annular Obstruction Target, $\epsilon = 0.40$, $\emptyset 400 \mu\text{m}$ Obstruction	\$160.74	Lead Time

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

$$\epsilon = \frac{\text{Obstruction Diameter}}{\text{Pinhole Diameter}}$$



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

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.

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	$\leq 216 \mu\text{m}$	0.5 mm
R1CA100		85 μm	100 μm			
R1CA200		170 μm	200 μm			
R1CA300		255 μm	300 μm			
R1CA500		425 μm	500 μm			
R1CA1000		850 μm	1000 μm			
R1CA2000		1700 μm	2000 μm			

- Ratio of the Obstruction Diameter to the Pinhole Diameter (See Photo to the Above Right)
- Concentricity of the Annulus with Respect to the Outer Diameter of the Quartz Glass Substrate
- 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, $\epsilon = 0.85$, Ø42.5 μm Obstruction	\$160.74	Today
R1CA100	Customer Inspired! Annular Obstruction Target, $\epsilon = 0.85$, Ø85 μm Obstruction	\$160.74	Today
R1CA200	Customer Inspired! Annular Obstruction Target, $\epsilon = 0.85$, Ø170 μm Obstruction	\$160.74	Today
R1CA300	Customer Inspired! Annular Obstruction Target, $\epsilon = 0.85$, Ø255 μm Obstruction	\$160.74	Today
R1CA500	Customer Inspired! Annular Obstruction Target, $\epsilon = 0.85$, Ø425 μm Obstruction	\$160.74	Today
R1CA1000	Customer Inspired! Annular Obstruction Target, $\epsilon = 0.85$, Ø850 μm Obstruction	\$160.74	Today
R1CA2000	Customer Inspired! Annular Obstruction Target, $\epsilon = 0.85$, Ø1700 μm Obstruction	\$160.74	Today

Visit the *Annular Aperture Obstruction Targets* page for pricing and availability information:

https://www.thorlabs.com/newgrouppage9.cfm?objectgroup_id=8531