THORLABS

VPCH412 - February 8, 2020

Item # VPCH412 was discontinued on February 8, 2020. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

HIGH-VACUUM CF FLANGE VIEWPORTS FOR Ø1" WINDOWS

▶ **CF Flange Viewports for High-Vacuum Systems**
▶ **Compatible with Ø1" Flat Windows**
▶ **Sapphire, CaF$_2$, or UV Fused Silica Windows**

Front

Back

VPCH12-FL
Ø1" Flat Window
Viewport

VGA10
Annealed Copper Gaskets,
10 Pack

VMH6
Flange Mounting Hardware Pack
(6 Bolts, 6 Nuts, & 12 Washers)

Hide Overview

OVERVIEW

Features

- Vacuum Level: 1 x 10^{-8} Torr (Max)
- Bake Temperature: 150 °C (Max)
- Flange Mounting Hardware Pack and Copper Gaskets Sold Below

Common Vacuum Specifications	
Vacuum Level	1 x 10^{-8} Torr (Max)
Max Temperature	150 °C
Thermal Gradient	20 °C/min (Max)

Thorlabs' high-vacuum-compatible Ø2.75" (DN40) CF Flange Viewports for Ø1" Optics are offered with one of three uncoated window substrates: sapphire (150 nm - 4.5 μm), CaF$_2$ (180 nm - 8.0 μm), or UVFS (185 nm - 2.1 μm). Please see the *Graphs* tab for transmission data. Additionally these viewports are compatible with our selection of stock Ø1" windows with thicknesses between 4.9 - 5.15 mm. These flanges are not compatible with wedged windows.

Designed for use at high-vacuum (HV) pressures, Thorlabs' CF viewports utilize Viton O-Ring seals to create an air-tight metal/glass seal, allowing for pressures down to 10^{-8} Torr. The vacuum windows are interchangeable, enabling the user to swap out vacuum windows mounted in our HV CF flanges. Additionally, CF flanges (viewports without vacuum windows) are also available that are also compatible with our Ø1" windows. Before swapping and attempting to install additional windows, please review the procedure outlined in the *Window Installation* tab above.

Copper gasket and mounting hardware sets for Ø2.75" CF flanges are also available below. Thorlabs also offers HV CF Flange Viewports for Ø1.5" windows and Ø1.5" wedged windows.
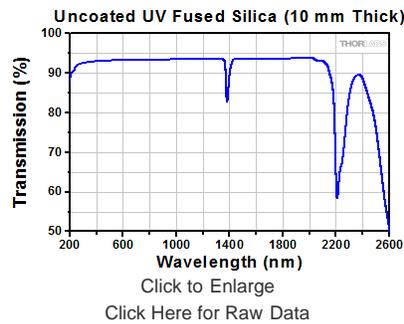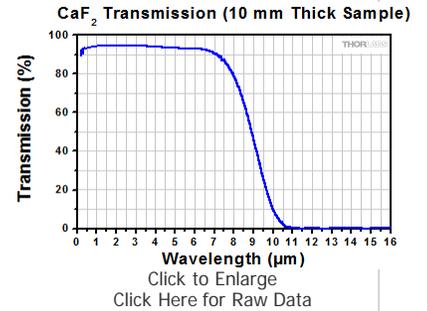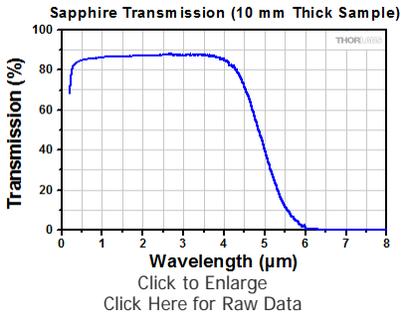
Hide Specs

SPECS

Item #	VPCH312	VPCH512	VPCH412
Window Material	Sapphire	CaF$_2$	UV Fused Silica

Window Item #	WG31050	WG51050	WG41050
Window Diameter (Unmounted)	1"		
Clear Aperture (in Viewport)	Ø0.7125" (18 mm)		
Transmitted Wavefront Error (@633 nm)	λ	$\lambda/8$	$\lambda/10$
Surface Quality	60-40 Scratch-Dig	20-10 Scratch-Dig	
Parallelism	<3 arcmin	<10 arcsec	≤5 arcsec

Hide Graphs

G R A P H S

The graphs below show the transmission of light through uncoated sapphire, calcium fluoride (CaF$_2$), and UV fused silica substrates. Raw data in the Excel format is available by clicking on the links below the graphs.

Sapphire Transmission (10 mm Thick Sample)
Click to Enlarge
Click Here for Raw Data

CaF$_2$ Transmission (10 mm Thick Sample)
Click to Enlarge
Click Here for Raw Data

Uncoated UV Fused Silica (10 mm Thick)
Click to Enlarge
Click Here for Raw Data

Hide Window Installation

W I N D O W   I N S T A L L A T I O N

Our high-vacuum (HV) viewports offer superb flexibility by allowing the user to install or swap out windows as they desire, or as experimental conditions demand. Installation of the windows is relatively quick and simple. This guide explains how to install and change windows in our Ø1.5" HV viewports. The installation procedures for the Ø1" HV viewports are identical to those for the Ø1.5" HV viewports with the only difference being that the front face plate of the Ø1" viewport contains 4 screws instead of 6.

Step 1:

Left: Viewport with front face removed. Middle: O-Ring is removed, inspect the seat. Right: Using comprssed air, remove loose debris from the seat.

Inspect the o-ring and seat for pits, scratches, or contamination. Remove any loose debris from the seat using compressed air.

Step 2:

Install the o-ring in the seat, and place the window on top of the o-ring (left image). Place the face plate on top of the window (right image).

Step 3:

Place the screws in the face plate holes and use the 2 mm hex key to turn each screw ~1.5 turns so that they are flush with the face plate but not tight.

Step 4:

Use a torque driver set to 30 in-oz to screw in all six setscrews. Refer to the sequence shown in the pattern above for the correct order in which the screws should be torqued. Please note that over-torquing the screws will risk damaging the window. While the viewports for Ø1" windows only have 4 screws, use the same sequence for tightening the screws.

High-Vacuum CF Flange for Ø1" Optics

- Ø2.75" CF Flange (Includes One O-Ring)
- Compatible with Ø1" Windows
- Not Compatible with Wedged Windows
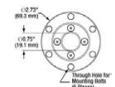
Click to Enlarge

Thorlabs' Ø2.75" CF flange does not include a window but is compatible with any Thorlabs Ø1" window that is 4.9 to 5.15 mm thick. When combined with the appropriate window, this flange allows for optical access into high-vacuum (HV) systems down to 10^{-8} Torr. This fixed (non-rotating) flange has six 1/4" (M6) through holes for bolting onto any standard Ø2.75" CF flange. Please note that mounting hardware is not included.

The CF-style flange utilizes a knife-edge mechanism to create an airtight seal between mating pieces. To create the seal, a copper gasket (available below) is most often employed. As the bolts of the mating pair are tightened, the knife edge "bites" into the copper gasket, deforming it. The extruded metal fills all the machining marks and surface defects, which yields a leak-tight seal.

Part Number	Description	Price	Availability
VPCH12-FL	Customer Inspired! Ø2.75" CF Flange for Ø1" Optics	$159.07	Lead Time

High-Vacuum CF Flange Viewports with Ø1" Windows

- Ø2.75" CF Viewport with Ø1" Windows
- Viton O-Ring Metal to Glass Seal
- Sapphire, CaF$_2$, or UVFS Window Included
- Clear Aperture: Ø0.7125" (18 mm)
- Not Compatible with Wedged Windows

Thorlabs' Ø2.75" CF flange viewports allow for optical access into high-vacuum (HV) systems down to 10^{-8} Torr. These are fixed (non-rotating) flanges with Ø1" windows that provide a Ø0.7125" clear aperture. These viewports have six 1/4" (M6) through holes for bolting onto any standard Ø2.75" CF flange. Please note that mounting hardware is not included. Our HV CF viewports can be purchased with one of three uncoated windows: sapphire, CaF$_2$, or UVFS. Additionally, the provided window may be replaced with any of our Ø1" windows that are 4.9 - 5.15 mm thick.

Part Number	Description	Price	Availability
VPCH312	Customer Inspired! Ø2.75" CF Flange, 150 nm - 4.5 µm Sapphire Window	$222.91	Today
VPCH512	Customer Inspired! Ø2.75" CF Flange, 180 nm - 8 µm CaF$_2$ Window	$228.33	Lead Time
VPCH412	Customer Inspired! Ø2.75" CF Flange, 185 nm - 2.1 µm Uncoated UVFS Window	$222.91	Lead Time

Hide CF Flange Copper Gaskets and Mounting Hardware

CF Flange Copper Gaskets and Mounting Hardware

- VMH6 Stainless Steel (18-8) Mounting Hardware Set Includes:
  - Six Bolts (Silver-Plated, 1/4"-28 x 1.50", 12-Point Heads)
  - Six Nuts and Twelve Washers
- Single-Use Copper Gaskets for Forming a Seal Between Ø2.75" CF Flanges
  - 101 Copper Alloy (99.99% Pure), OFHC (Oxygen-Free High Conductivity)
  - VGC10: 1/4-Hard Copper Gaskets
  - VGA10: Annealed Copper Gaskets

Click to Enlarge
VGA10 Copper Gasket
Installed on VPCHW42-C
Viewport

Thorlabs offers mounting hardware and single-use copper gaskets for mating Ø2.75" CF flanges. These flanges utilize a knife-edge mechanism to create an airtight seal between mating pieces. To create the seal, a copper gasket is most often employed. As the bolts of the mating pair are tightened, the knife edge bites into the copper gasket, deforming it. The extruded metal fills all the machining marks and surface defects, which yields a leak-tight seal.

1/4-hard and annealed copper gaskets are sold in sets of 10. We recommend the 1/4-hard copper gaskets for most applications; for more delicate devices, such as viewports, we recommend using the softer annealed copper gaskets to lower the chance of deformation in the optic due to stress in the flange. The set of stainless steel mounting hardware includes six silver-plated bolts, six nuts, and twelve washers. The silver plating on the bolts acts as a lubricant to prevent galling between the stainless steel surfaces of the bolt and the nut.

Instructions
First ensure the knife-edge mating surfaces of the CF flanges are free from debris or scratches. Then choose the desired bolt hole orientation and insert the gasket, aligning leak-test grooves on the flanges if present. Slide a washer onto the bolt, insert the bolt through the flanges, and add another washer before screwing on the nut. Hand tighten each bolt, then use two wrenches to hold the bolt head and turn the nut. Tighten the nuts gradually in 1/8 to 1/4 turn increments in an alternating crisscross star pattern until the desired tightness is reached. Following these steps will result in a reliable seal with even gasket compression and deformation.

Part Number	Description	Price	Availability
VMH6	Mounting Hardware for CF Flanges: 6 Silver-Plated Bolts, 6 Nuts, 12 Washers	$17.51	Today
VGC10	1/4-Hard OFHC 99.99% Pure Copper Gaskets for Ø2.75" CF Flange, 10 Pack	$41.20	Today
VGA10	Annealed OFHC 99.99% Pure Copper Gaskets for Ø2.75" CF Flange, 10 Pack	$92.70	Today

Visit the *High-Vacuum CF Flange Viewports for Ø1" Windows* page for pricing and availability information:
https://www.thorlabs.com/newgrouppage9.cfm?objectgroup_id=4962