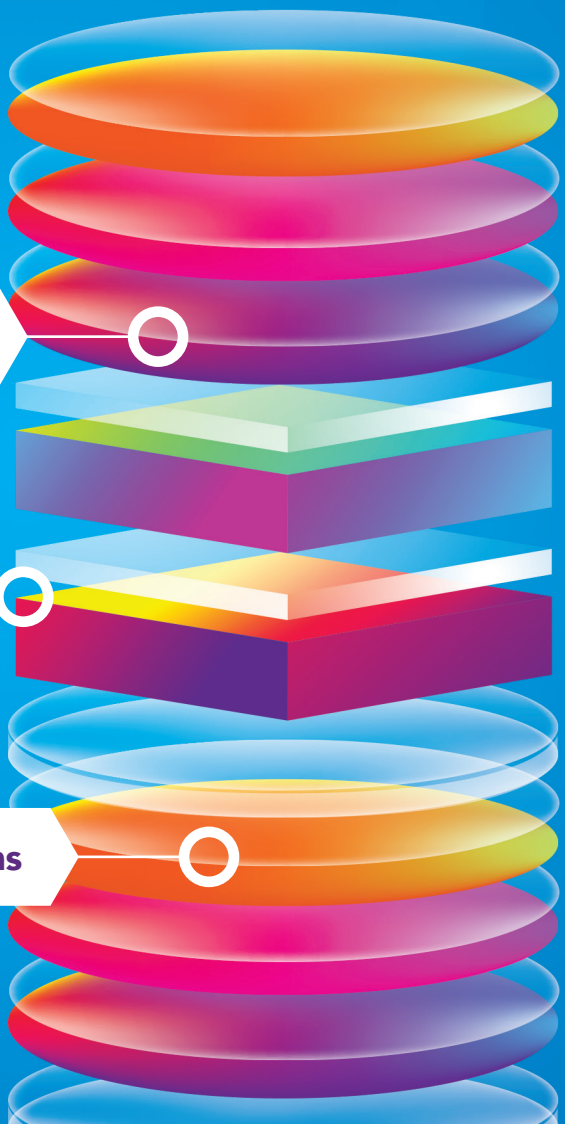
Customizing Catalog Optical Filters Guide

YOUR COMPREHENSIVE GUIDE TO TAILORING SEMROCK OPTICAL FILTERS



IDEX HEALTH & SCIENCE | Semrock

Intelligent Solutions for Life®

Fluidics | Optics | Consumables | Assemblies

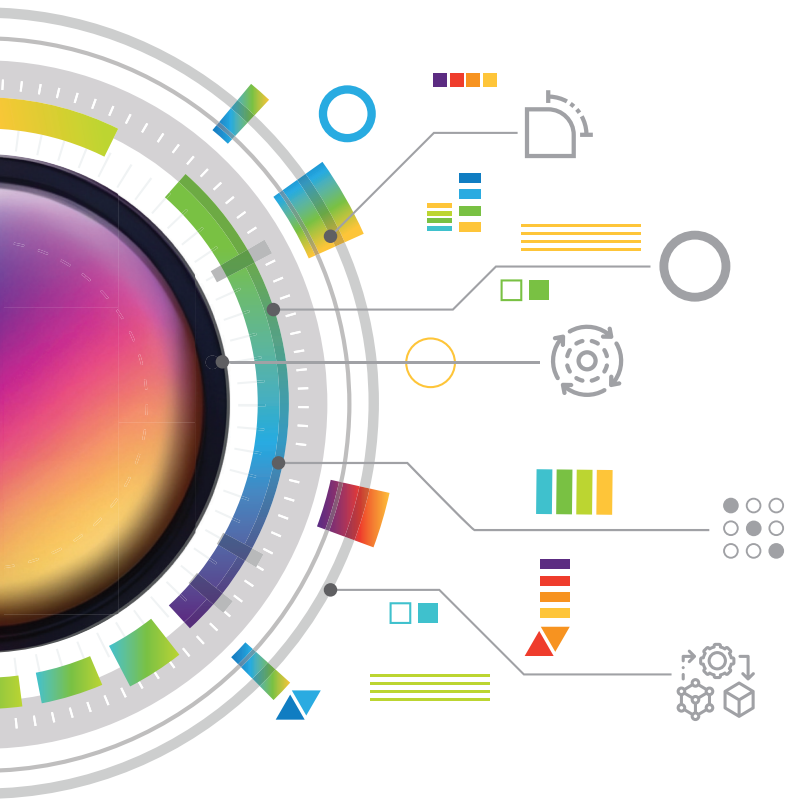
Mastering Customization

Your Guide to Perfectly Tailored Optical Filters

In the world of high-quality optical filters, where precision is paramount, the ability to tailor parts to your exact requirements is essential. At IDEX Health & Science, we offer a range of Semrock™ optical filters to meet your specific needs. This guide will introduce you to our available customization options, listed below.

Custom-Sized Catalog

The IDEX Health & Science website offers custom sizing of Semrock catalog filters. Whether you need an unmounted round or a rectangular filter, or need the filter mounted into one of our standard-sized aluminum housings, you can use our Custom Sizing Tool to calculate the price for the required quantity of the part number and add it to your cart to purchase. Need a larger Clear Aperture (CA) or a custom part marking? We can accommodate that as well.



Semi-Custom

If the catalog spectral, wavefront, glass, and thickness specifications meet your needs, but you require more flexible sizes and/or shapes, we offer the so-called Semi-custom filters. These use our catalog coated stock with its custom sizing options, but now with further customization options like tighter dimensional tolerances, larger clear apertures, and corner cuts. You can also personalize filters with customized packaging labels, QC data, and part markings.

Fully Custom

If you have spectral or wavefront requirements that are not found in the catalog, or if you need different substrate glass thickness or material, we offer fully custom optical designs, which require a dedicated coating run. The filters made from such coating runs can use the full range of physical shaping options described here.

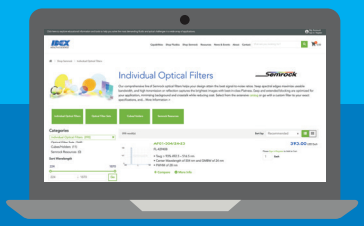
Table 1, page 3, summarizes the essential characteristics of each of the customization categories. For full details, refer to Table 7 on page 10.

CUSTOM-SIZED CATALOG	SEMI-CUSTOM	FULLY CUSTOM
› Custom sizing of Semrock catalog filters › Can be ordered online for most sizes › Uses a catalog part number	› Customization of catalog coated material › Uses a custom part number	› Full customization › New coating run › Uses a custom part number
› Spectral specifications are the same as for the catalog part	› Spectral specifications are the same as for the catalog part	› New or modified spectral specifications
› Substrate glass thickness and material are the same as the catalog part	› Substrate glass thickness and material are the same as the catalog part	› Glass thickness or substrate specification (type, wedge, TWE, flatness) are custom specified
› Custom dimensions › Any standard housing can be selected	› Custom dimensions › Any standard housing can be selected › Corner cuts can be specified	› Custom dimensions › Any standard housing can be selected › Corner cuts can be specified
› Standard catalog specifications apply	› Customization Options › Dimensional tolerances, clear aperture, part marking, packaging and package labeling, custom Data	› Customization Options › Dimensional tolerances, clear aperture, part marking, packaging and package labeling, custom Data

Table 1. Summary of customization categories for Semrock™ filters; see Table 7 for details.

Resources

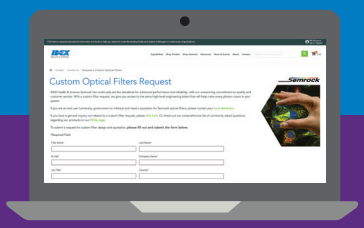
Use these resources to select or specify the specific customizations described in this guide.



Custom Part Builder Tool

Create your own custom-sized Semrock optical filter or check the in-stock availability of optical filters in your desired size using our Custom Part Builder tool, located below the product description on each product web page. Learn more by exploring our Custom Part Builder Tutorial.

Explore the Tutorial:
idex-hs.com/part-builder-tool



Custom Form

To request a semi-custom or fully custom filter, fill out our online form at the link below. Alternately, you can attach a completed Semrock Optical Filters Requirements Worksheet per filter using the "Choose File" option.

Explore the Tutorial:
idex-hs.com/custom-optics

Semi-Custom Product Capabilities

Custom Sizing

At IDEX Health & Science we coat on material that we dice or core drill to the final part size, so you can purchase our catalog designs with the precise dimensions needed. We offer both round and rectangular custom-sized catalog parts with size typically ranging from 5 mm to 50.8 mm.

A selection of sizes can be ordered on our website, using our Custom Part Builder tool located below the product description on each product page.

	CUSTOM-SIZED CATALOG Available Using **Custom Part Builder** tool on the Website	CUSTOM-SIZED CATALOG Available Using **Custom Form** on the Website	SEMI-CUSTOM
UNHOUSED ROUND FILTERS	› 10 mm to 40 mm* whole millimeter sizes › 12.5, 12.7, 21.8, 23.3, 25.4, 50 and 50.8 mm* diameters	› ≥ 5 mm diameter › Maximum size depends on filter type and available coated material › Nonwhole millimeter sizes	› ≥ 5 mm diameter › Maximum size depends on filter type and available coated material › Nonwhole millimeter sizes
RECTANGULAR FILTERS	› 5 mm to 50.8 or 55 mm* lateral dimension › Any nonwhole millimeter size › 5:1 maximum ratio	› ≥ 5 mm lateral dimension › Maximum size depends on filter type and available coated material	› ≥ 3 mm lateral dimension › Maximum size depends on filter type and available coated material › Corner cuts

Table 2. Custom Sizing Capabilities.

** Filter families including but not limited to RazorEdge™, MaxLine®, MaxDiode™, LaserMux™, NIR, MaxMirror®, and Verona™ may be limited to smaller maximum sizes.*

Need a size outside the Custom Part Builder's offering, such as with a 31.4 mm unmounted diameter or a 60 x 60 mm square? Please contact us — it's possible we can accommodate your request.

Some filters are limited to smaller sizes due to their demanding spectral specifications, while others can be available in sizes 70 x 70 mm or larger.

Note that if you are looking for parts with nonwhole millimeter dimensions or small sizes, rectangular shaped filters are preferred due to greater manufacturing flexibility.

Semi-Custom Product Capabilities (Continued)

Housed Filters

IDEX Health & Science offers standard-sized aluminum housings with the following outer dimensions: 12.5 mm, 25 mm, 25 mm Sutter Threaded Rings, 32 mm, and 50 mm.

In the standard catalog configuration, each housed filter is available in only one filter housing thickness, either 3.5 mm or 5.0 mm. However, you can order it mounted in any of our other standard housings. There are no charges applied when changing just the filter housing thickness from 3.5 to 5 mm and conversely. This option is however currently not available from the Custom Part Builder, so please use the Custom Form to request it.

EXAMPLE: The catalog part FF01-680/42-25 is available mounted in a 3.5 mm thick, 25 mm diameter housing. If you instead prefer this mounted in a 5 mm thick housing, use the Custom Form; you can order the FF01-680/42-25x5.0 at the same price.

For some filters, our Custom Part Builder does not allow selection of the housed version. These are typically filters with Flatness or RWE specifications, which would be degraded by the stress induced by the mounting. Such filters can be obtained as Semi-custom, with the same specifications as the catalog part but without guaranteed Flatness and RWE performance.

If you need housed filters with different dimensions or specific mechanical requirements, ask us — we can design custom filter housings, as well as assemble filters into customer-supplied modules.

HOUSING THICKNESS	HOUSING DIAMETER			
	12.5 mm	**25 mm**	**32 mm**	**50 mm**
3.5 mm*	CA = 10 mm	CA = 22 mm	CA = 29 mm	CA = 45 mm
5.0 mm	CA = 10 mm	CA = 21 mm	CA = 29 mm	CA = 45 mm

Table 3. Standard-sized Housings.

** The 3.5 mm thick housings can only accommodate substrate thicknesses ranging from 1.05 mm to 2.0 mm; the 5.0 mm thick housings can be selected for any of our filters with substrate thickness from 1.05 mm to 3.5 mm.*

Custom Dimensional Tolerances

The standard dimensional tolerance for unmounted Custom-sized Catalog filters is ± 0.1 mm. We can accommodate tighter tolerances using the Semi-custom option, preferably larger than 0.1 mm full range, for instance +0/- 0.1 mm, or ± 0.05 mm.

	CUSTOM SIZED CATALOG	SEMI-CUSTOM
Unhoused Round Filters	± 0.1 mm	Can be customized to tighter tolerance
Rectangular Filters	± 0.1 mm	Can be customized to tighter tolerance
Housed Filters	+0 / -0.1 mm	+0 / -0.1 mm unless a custom housing is used

Table 4. Custom Dimensional Tolerances.

Edge Blackening

Edge blackening is the application of a matte black paint to the edges of an optical filter to prevent stray light inside the filter from re-entering the light path outside the filter or to prevent stray light from entering.

For questions about the lifetime of edge blackening paint on a filter and if there are any special methods to clean these filters, visit our Optical Filters FAQs at www.idex-hs.com/optical-faqs

IDEX Health & Science offers edge blackening for most Semrock optical filters. Our Custom Part Builder tool allows specifying edge blackening to Custom-sized Catalog filters, by appending -EB to the part number.

Please contact us for sizes outside the Custom Part Builder options so we can best address your needs. Edge blackening may not be suitable if the part is too small. There are also limitations to the maximum clear aperture and dimensional tolerances. Finally, our new machine printed edge blackening may be a lower cost option than manual edge blackening which is used for custom-sized catalog parts and small volumes.

Learn More About Edge Blackening:
idex-hs.com/edge-blackening

Semi-Custom Product Capabilities (Continued)

Custom Clear Aperture

Optical filters are designed with a defined Clear Aperture (CA), i.e., the area of the filter over which spectral and cosmetic specifications are guaranteed. The CA is specified either in millimeters (mm) or as a percentage (%) of the overall dimension.

Although the optical coating extends to the edge of every Semrock filter, the CA must be less than the transverse dimensions for each filter.

In the case of housed filters, the maximum CA is limited by the aperture of the ring or housing, and thus depends on the housing diameter and thickness; please refer to Table 3.

For unmounted optical filters, the standard CA is 85% of the filter dimension for round parts and 80% elliptical for rectangular parts. This is the specification that applies to Custom-sized Catalog filters. In most cases, and when required by the application, a CA greater than 90% is possible using the Semi-custom option.

However, a larger CA makes the part more difficult to manufacture due to the requirement to meet both the spectral specification and the cosmetic specification over the entire CA, especially for parts with large dimensions or demanding specifications. It is also necessary to keep a minimum clearance between the CA and the physical edge of the filter to allow for bevels and any edge defects that may occur when the part is cut from the coated substrate. We recommend allowing at least 0.5 mm clearance from each edge, hence a maximum CA of 80% for smaller filters with 5 mm diameter or lateral dimension.

	CUSTOM SIZED CATALOG	SEMI-CUSTOM
Unhoused Round Filters	≥ 85% of the outer diameter	Can be customized
Housed Round Filters	Dependent on the housing (diameter and thickness)	Dependent on the housing (diameter and thickness)
Rectangular Filters	≥ 80% of the filter's transverse dimensions, elliptically shaped	Can be customized, larger and/or rectangular

Table 5. Clear Aperture.

Custom Part Marking

We offer a variety of custom markings to help easily identify your filters. The following options may have some limitations depending on the filter size, thickness and/or clear aperture. Please contact us to discuss your specific requirements.

	CUSTOM SIZED CATALOG	SEMI-CUSTOM
Unhoused Round and Rectangular Filters	Hand drawn caret mark ">" on the edge indicating the preferred light direction	Marking on the edge** › Text › Caret mark ">" › Colored dots Laser engraving on the filter face: › Scribe marks, dots, and text
Housed Filters	Laser engraving on the housing: › Catalog reference › Arrow "→" indicating the preferred light direction*	Laser engraving on the housing: › Custom text › Arrow "→" in custom direction

Table 6. Part Marking Capabilities.

* *Except for a selection of BrightLine® Multiphoton filters.*

** *Edge marking can be either applied manually or printed by machine. Our machine printed Edge Blackening process can be used to mark filter edges with text, colored dots, and an arrow, even on filters that are not edge blackened.*

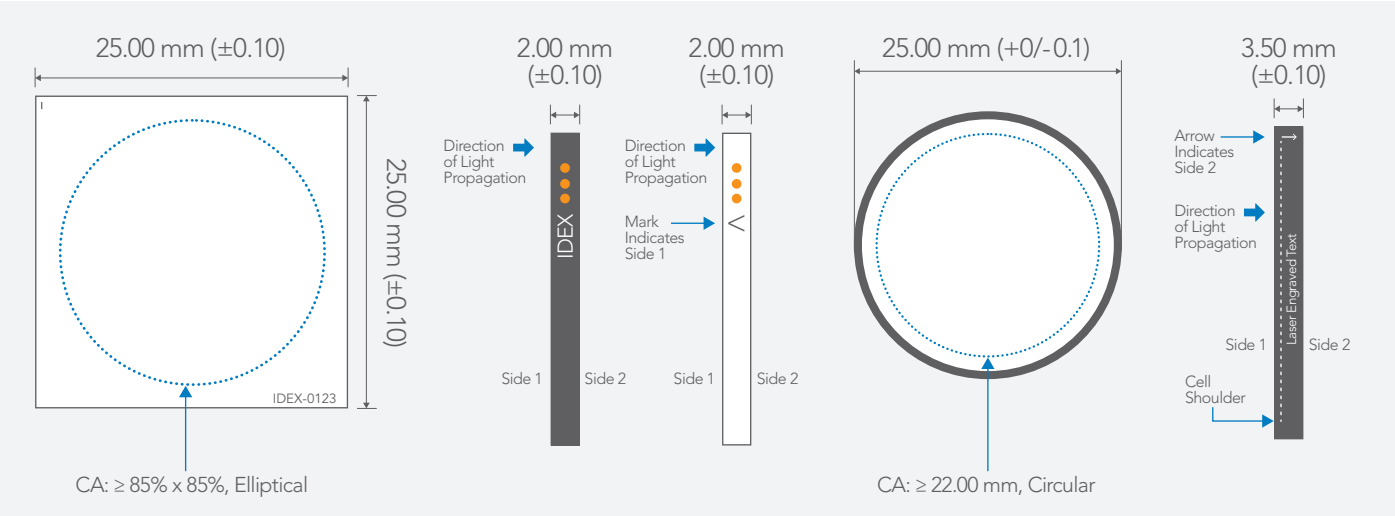


Figure 1. Examples of Part Marking Options.

Packaging and Packaging Label Requirements

Our standard and Custom-sized Catalog filters are delivered in individual packaging, with a pre-defined packaging label that includes the part number, lot code and work order for traceability.

We offer other filter packaging options including Gel-Pak, Vacuum-Release™ (VR) trays, or multi-cavity Pet-G trays. The Packaging Label can also be customized to include custom description such as your part number.

What Makes a Filter Fully Custom?

A filter requires a new coating run if it meets any of the following criteria:

- New design
- Spectral modifications (Any change that would cause the current coated stock to FAIL when checking against the new specifications)
- Mechanical modifications, i.e., change to the glass thickness, material, or properties (Wedge, TWE, Flatness)

Quick Reference Guide

While many customization options are available, changes to spectral specifications, glass thickness, or material (Type, Wedge, TWE, Flatness) will require a new custom run and make the part fully custom.

	CUSTOM-SIZED CATALOG	SEMI-CUSTOM	FULLY CUSTOM
Summary	› Custom sizing of Semrock catalog filters › Available from Custom Part Builder Tool for most sizes, otherwise use the Custom Form › Uses a catalog part number	› Customization of catalog coated material › Uses a custom part number › Available using Custom Form	› Full customization › New coating run › Uses a custom part number › Available using Custom Form
Examples	FF01-620/52-12-D: Custom transverse dimension FF01-620/52-25x5.0: Non-standard cell thickness FF506-Di03-15x15-EB: Custom transverse dimension with edge blackening	IDEX-0001: FF01-387/11-15-D with custom +0/-0.1 mm tolerance (standard = ±0.1 mm) IDEX-0002: FF409-Di03-28x35 with custom 85% CA (standard = 80%)	IDEX-0003: FF01-592/8-25 but coated on 2 mm Fused Silica IDEX-0004: Specifications of FF01-468/553, but with the second passband widened by 10 nm
Spectral Specifications	Identical to the catalog filter	Very similar to the catalog part; slight adjustments allowed if compatible with the catalog design	New design or spectral modifications
Substrate Material, Thickness, and/or Specifications (Wedge, TWE, Flatness)	Identical to the catalog part; no change to the glass thickness or material	Identical to the catalog part; no change to the glass thickness or material	Glass thickness and substrate specification (Type, Wedge, TWE, Flatness) are custom

Table 7. Fully Custom versus Custom-sized Catalog and Semi-custom options.

	CUSTOM-SIZED CATALOG	SEMI-CUSTOM	FULLY CUSTOM
Dimensions	› Custom dimensions › Any standard housing can be selected › Option to change the housing thickness	› Custom dimensions › Standard or custom housings available › Option to change the housing thickness	› Custom dimensions › Standard or custom housings available
Corner Cuts	None	Can be specified	Can be specified
Dimensional Tolerances	› ± 0.1 mm › +0/-0.1 mm for housed parts	› Other than ± 0.1 mm › +0/-0.1 mm for housed parts, unless using a custom housing	› Other than ± 0.1 mm › +0/-0.1 mm for housed parts, unless using a custom housing
Clear Aperture	85% (round filters) or 80% elliptical (square / rectangular filters)	Can be customized	Can be customized
Part Marking	› Hand drawn caret mark ">" on the edge › Laser engraved catalog reference & arrow for housed parts	Can be customized	Can be customized
Cosmetic Quality, Edge Chip & Bevel Specification	Identical to the catalog part	Can be customized	Can be customized
TWE, Flatness, RWE	Identical to the catalog part	Can be customized provided it is compatible with the catalog design	Can be customized
Packaging & Package Labeling	Individual packaging and standard package label	Can be customized	Can be customized
QC Data	No	Can be customized	Can be customized

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For ordering, technical support,
and contact information please visit
www.idex-hs.com/custom-optics