

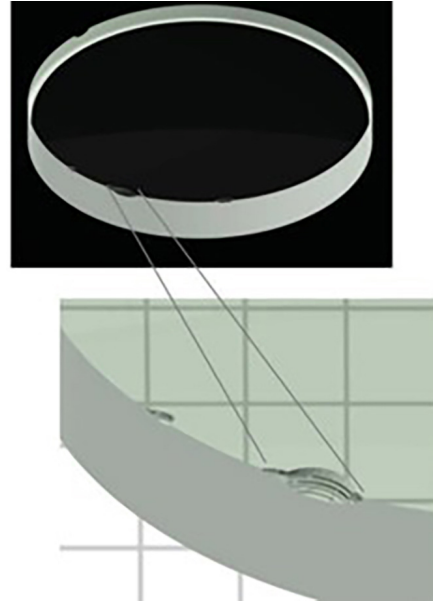
# Edge Chip Inspection

Robust and Reproducible Process Used Across 6 Million Filters and Counting

The IDEX Health & Science | Semrock filters manufacturing teams have provided this overview to assist in the understanding, interpretation, and acceptance of supplied filters with visible edge chips. These edge chips are normally occurring phenomena for all optical glass based products and are considered when evaluating the spectral and mechanical performance of a filter. We seek to establish excellent agreement between our outgoing inspection process and your Quality Department's incoming inspection to ensure a continued supply of filters with agreed-upon specifications.

Edge chips refer to surface imperfections that can be found on the edge of a glass-based optic. IDEX Health & Science by default uses the ANSI/OEOSC OP1.002, American Standard for edge chip. Per the ANSI standard, edge chips are allowed, provided they meet the following conditions and limitations:

- › They do not intrude on the Clear Aperture (CA).
- › They do not interfere with sealing the filter into a housing.
- › All chips larger than 0.5 mm shall be stoned to an acceptable tolerance (Stoning is the process of polishing edge chips by use of a handheld grinding tool).
- › The sum of the chip widths larger than 0.5 mm, measured at the edge of the filter, shall not exceed 30% of the perimeter of the filter (See page 2 for how to calculate this).
- › The area of stoned chips and fractures shall not exceed 2% cumulative of the area of the beveled edge of the filter.
- › Edge chips which are totally contained within a beveled surface shall not exceed 2 mm of depth or 5% of the part diameter, whichever is smaller, and shall not exceed 2% of the area of the beveled edge.



## ANSI Edge Chip Inspection Materials:

- › Inspection Light Source
  - Semrock filters are inspected using lighting conditions defined in the ANSI standard, i.e., two 15 W cool white fluorescent tubes mounted in a desktop lamp fixture
- › Inspection Equipment
  - Flow hood bench with HEPA filter and black background
- › Cleaning products:
  - Compressed air
    - IDEX Health & Science recommends clean, filtered, compressed nitrogen or air
  - Deionized (DI) Water
  - Isopropyl Alcohol or Acetone\*
  - Cloth clean room wipes
  - Foam-tip cleaning swabs
- › Optical Filter-handling products:
  - Nitrile gloves
  - Delrin-tipped tweezers

\* always follow your corporate health and safety standards for use and storage of hazardous chemicals

## ANSI Edge Chip Evaluation Instructions:

Watch Our Tutorial Here: [idex-hs.com/clean-optical-filters](https://idex-hs.com/clean-optical-filters)

1. While wearing nitrile gloves, and holding the filter with Delrin-tipped tweezers, clean the filter by blowing off loose contaminants with compressed air at an oblique angle



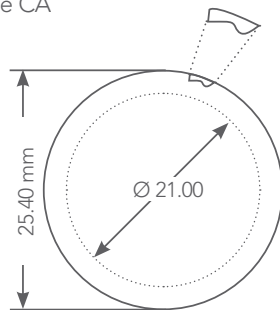
- a. If the filter is very dirty, clean the surface by applying minimal solvent to a swab and wiping firmly with one continuous motion as shown here.\*

2. Evaluation is performed under the lighting described above and against a matte black background. A filter is held at an angle to allow the reflected light to reach the eye.
3. Inspect the filter to determine whether the ANSI edge chip criteria have been met.

In the example below, the filter has a CA of  $\geq 21$  mm, meaning that only a specified level of cosmetic imperfections is permitted within the 21 mm CA.

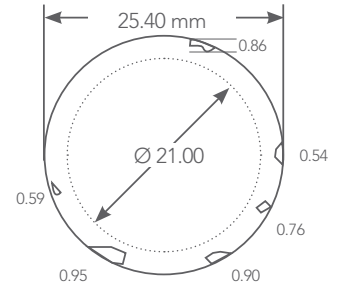
### Example of a PASSING part:

- Edge chip does not intrude into the CA
- Edge chip does not prevent filter from being sealed into a housing
- There are no chips  $> 0.5$  mm that should be stoned
- There are no chip widths larger than 0.5 mm that, when measured at the edge of the element, exceed 30% of the perimeter of the element



### Example of a PASSING part:

- Edge chips do not intrude into the CA
- Edge chips do not prevent filter from being sealed into a housing
- Edge chips  $> 0.5$  mm can be stoned
- There are no chip widths larger than 0.5 mm that, when measured at the edge of the element, exceed 30% of the perimeter of the element (calculation shown here):



#### Determine the edge perimeter

$$\begin{aligned} \text{Perimeter} &= 2\pi r \text{ (where } r = \text{CA}/2) \\ &= 2 \times 3.1416 \times 10.5 \text{ mm} \\ &= 65.97 \text{ mm} \end{aligned}$$

$$30\% \text{ of the perimeter} = 65.97 \text{ mm} \times .30 = 19.79 \text{ mm}$$

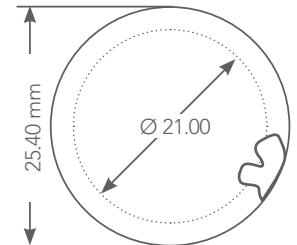
$$\begin{aligned} \text{Add up the chip widths } > 0.5 \text{ mm} \\ (0.59 + 0.95 + 0.90 + 0.76 + 0.54 \\ + 0.86) \text{ mm} &= 4.6 \text{ mm} \end{aligned}$$

4.6 mm does not exceed 19.79 mm

For additional review or questions about the cosmetic specification of your Semrock filters, our Applications Engineering or Technical Support team can be reached by e-mailing [Semrock@idexcorp.com](mailto:Semrock@idexcorp.com).

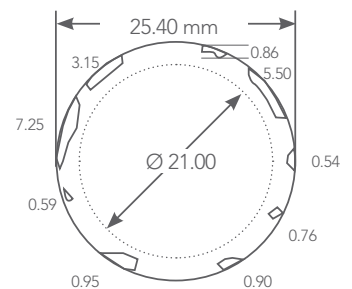
### Example of a FAILING part:

- Edge chip intrudes into the CA



### Example of a FAILING part:

- There are chips  $> 0.5$  mm
- There are chip widths larger than 0.5 mm that, when measured at the edge of the element, exceed 30% of the perimeter of the element



\* always follow your corporate health and safety standards for use and storage of hazardous chemicals