

Product Manufacturing Capability Summary

Dyna-Film Optical Bandpass Filters

Dyna-Film Optical Bandpass Filters are designed to optimize spectral performance, provide exceptional environmental durability, and minimize the cost of optical bandpass filtering required for absorbance, reflectance, and transmissive applications. Bridging the gap between traditional bandpass filters and expensive budget busting sputtered films, Optometrics has combined best practices learned over the past 40 years as a leading manufacturer of catalog and OEM optical filters, with today's most advanced optical materials, construction methods, and large volume manufacturing capabilities. Dyna-Film Optical Bandpass Filters benefit the many instrument manufacturers which require the following critical spectral and physical performance characteristics:



- ✓ **High Transmission**
- ✓ **Deep Blocking**
- ✓ **Great Environmental Durability**
- ✓ **Low Cost**

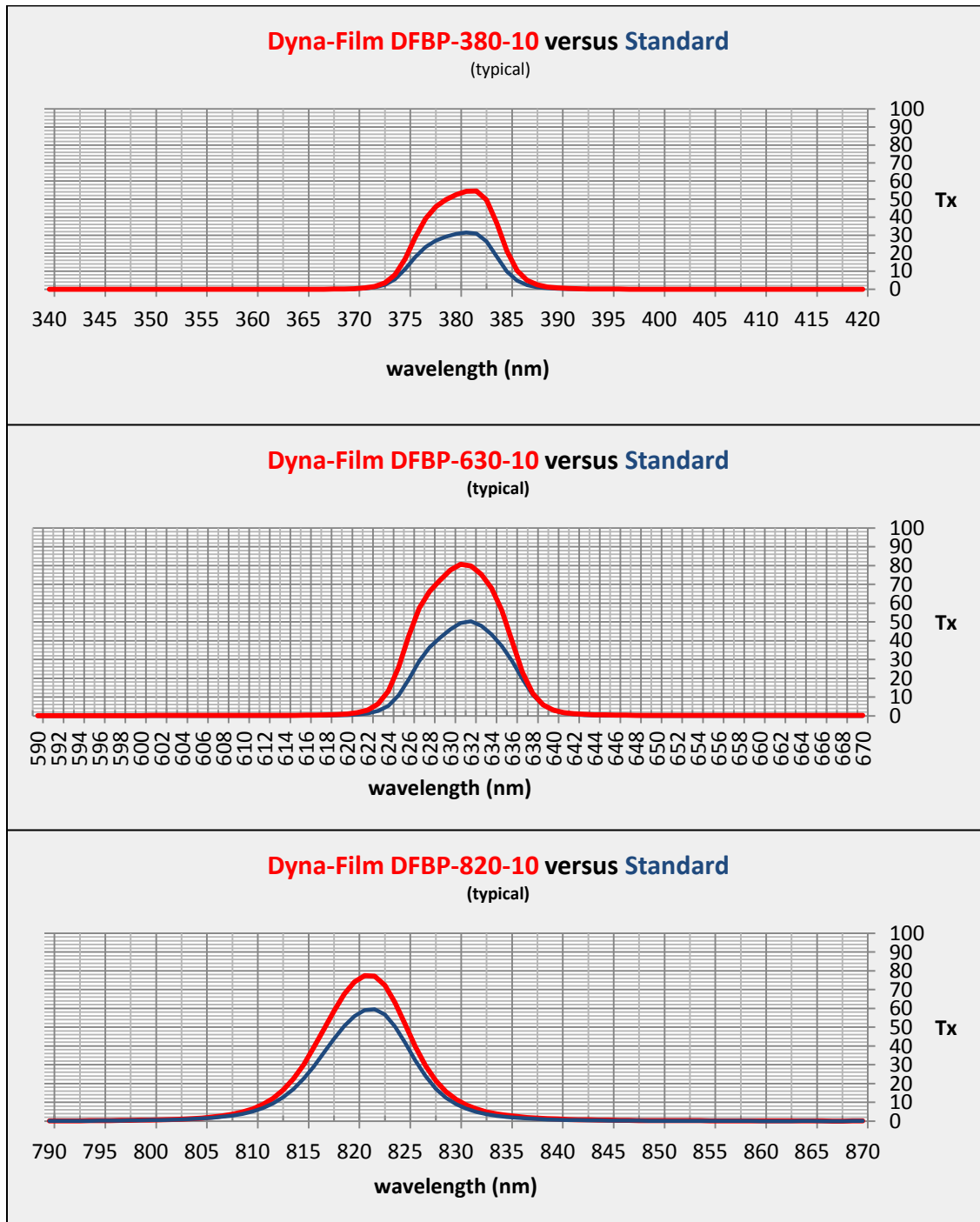
Optometrics is a leading and trusted resource, providing rapid delivery of high quality optical filters with characteristics designed to meet the unique spectral tolerance and size requirements of photonics based OEM instrument manufacturers worldwide.

Typical Design Characteristics

- Central Wavelengths from 340 nm to 1100 nm
- No compromise in blocking from 200 nm to 1200 nm
- 3 - 40 nm Bandwidths
- Mounted in black anodized aluminum rings
- Advanced methods and materials for superior environmental durability
- Easily customized to optimize your application.

High Transmission

Optometrics proprietary engineering design and manufacturing processes, guided by over 40 years of manufacturing experience and today’s best materials and technology compatibility, has enabled the new Dyna-Film series of high transmission optical bandpass filters. The following three examples demonstrate the typical performance improvement when compared to standard optical filters.



Deep Blocking

Dyna-Film Optical Bandpass Filters are typically constructed having out of band spectral rejection of 1×10^{-4} (**4 OD**) average over the common **200 nm – 1200 nm** spectral band. Opportunities may exist for additional performance enhancement or cost savings if your OEM application does not require this level or spectral range of blocking. Please contact Optometrics for free consultation and a quotation based on your exact requirements.

Great Environmental Durability

Materials used in the construction of industry standard thermally evaporated thin film optical bandpass filters have been known to be susceptible to early catastrophic degradation caused by thermal and humidity cycling. When used in controlled ambient conditions, the standard filters are often a good choice due to their wide selection and affordability. Although, when used in applications which experience a higher level of thermal expansion and wet/dry cycling, integrated components such as thick metallic soft film coating layers may separate from adjoining substrates and oxidize, causing failure.

Optometrics has performed extensive studies on potential failure mechanisms, resulting in superior design and manufacturing methods which integrate “Hard Coatings” and other optimized materials and manufacturing processing techniques. The increased performance and environmental durability provides opportunities for reduced service costs and down-time of your instruments.

The quantification of optical bandpass filter environmental durability is specified many ways by many manufacturers. Two common procedures which are referenced include MIL-STD-810E (Method 507.3, Procedure III), and MIL-C-48497A (Humidity). Please reference the following abbreviated description of each:

MIL-STD-810E (Method 507.3, Procedure III)

In this procedure, the components are placed into an environmentally controlled test chamber, then:

1. The internal chamber temperature is raised to 60°C (140°F) and the relative humidity to 95% +/-5% over a period of two hours.
2. These conditions are held for not less than six hours.
3. While the relative humidity is maintained at 85% or higher, the internal chamber temperature is gradually reduced to 30°C (86°F) over an eight hour period and the relative humidity is leveled at 95% +/- 5%.
4. The conditions of 30°C (86°F) and 95% +/- 5% relative humidity are maintained for an additional eight hours.
5. Repeat steps 1 through 4 for a total of 10 cycles (not less than 240 hours)
Note: Some optical bandpass filter supplier’s claim durability for only 5 cycles.

MIL-C-48497A (Humidity)

In this procedure, the components are placed into an environmentally controlled test chamber and exposed to a temperature of 120°F and 95% to 100% relative humidity for a minimum of 24 hours. After this exposure, the coatings are cleaned and evaluated for:

1. Physical - The coating shall have no evidence of flaking, peeling, cracking or blistering.
2. Environmental and solubility blemishes – The coated surface shall be free of blemishes such as stains, smears, discolorations, streaks, cloudiness, etc., that would cause non-conformance to the coatings spectral requirements.

It is Optometrics opinion that MIL-STD-810E (Method 507.3, Procedure III) is a more severe test procedure, and therefore provides greater accuracy in the predictability of durability.

Optometrics testing - Both Standard and Dyna-Film Optical Bandpass Filters were tested in an environmental test chamber following the MIL-STD-810E (Procedure III) protocol. There is a large opinion that each day in the test chamber corresponds to approximately 1 year of operation in a relatively high temperature and humidity cycling atmosphere. Filters were exposed for 7 days and then checked for delamination, visible deterioration, and spectroscopic failure. Then, alternating days of visual inspection only and full inspection were performed.

While the standard class of filters exhibited signs of delamination at cycle 7, Dyna-Film Optical Bandpass Filters survived beyond 15 cycles.

Low Cost

Optometrics, along with our Dynasil Photonics Business sister companies, operates over 30 optical thin film coating chambers utilizing various methods of thermal evaporation and hard film coating process technologies. These coating chambers are various sizes which enables Optometrics to provide fast delivery services of both small lots, as well as very high volumes. Twelve of these chambers are capable of producing up to forty square feet of coated substrate material per coating run.



Combining these capabilities and capacities provides Optometrics the ability to minimize manufacturing costs, resulting in a very beneficial cost saving opportunity for the instrument designer and manufacturer. Compare Optometrics quality, service and price. Request a quote today and see the difference!

Solutions for molecular spectroscopy applications including:

- Ultraviolet Visible (UV-Vis) Spectroscopy
- Near-Infrared (NIR) Spectroscopy
- Clinical Chemistry
- Color Measurement Spectroscopy
- Water Analysis
- Pharmaceuticals
- Biotechnology
- Waste Sorting
- Food and Beverages Testing
- Environmental Testing
- Research
- And many more

Performance Guide	
Center Wavelengths	340 – 1100 nm
FWHM (50% bandwidths)	3 – 40 nm
Blocking Density: (Average)	1×10^{-4} , OD 4
Blocking Range:	200 - 1200 nm
Minimum Peak Transmission	CWL 340 – 450 nm: 45% CWL 451 – 905 nm: 75%
Angle of Incidence:	0 degrees
Effective Refractive Index: (nominal)	1.45 for wavelengths 340 – 460 nm 2.05 for wavelengths 470 – 1100 nm
Specification Temp:	23° C
Survival Temp Range:	-50° C to +50° C (CWL's < 400 nm) -50° C to +70° C (CWL's > 400 nm) (Not designed for high power lasers)
Thermal Shift:	0.015 nm/°C to 0.025 nm/°C (340 – 1100nm) Typical
Optical Quality	Commercial
Surface Quality	80/50
Humidity Resistance:	MIL-810-810E, Method 507.3, Procedure III, >10 cycles
Ring Material	Aluminum. Black Anodized.
Ring Marking	Per specification
Cleaning Method:	Gentle, non-abrasive method using isopropyl alcohol or acetone

Production volume and OEM purchasing

Please contact Optometrics to review:

- Volume pricing
- Delivery scheduling
- Potential design optimization for your application
- Special laser marking requirements
- Special packaging and labeling requirements
- Special inventory logistics (Kanban, Consignment)
- Special testing services
- OEM assembly services

Proven capabilities and capacity provides Optometrics the ability to minimize manufacturing costs. Compare Optometrics quality, service and price. Request a quote today and see the difference!

Determine if **Dyna-Film** Optical Bandpass Filters are best for your requirement

To consult with an engineer, request a quote, or order samples:

Send your specifications or requirement summary to Sales@optometrics.com

Call Optometrics at 978-772-1700 to consult directly with a Product Design Specialist today.



Wavelength Selection Solutions!

Summary of Optometrics products

	UV	VIS	NIR	IR
Diffraction Gratings				
Master / Custom				
<i>Ruled</i>	•	•	•	•
<i>Holographic</i>	•	•	•	
Reflection				
<i>Ruled</i>	•	•	•	•
<i>Holographic</i>	•	•	•	
Transmission				
<i>Ruled</i>	•	•	•	•
<i>Holographic</i>	•	•	•	
Optical Coatings				
Bandpass Filters	•	•	•	
Long Wave Pass	•	•	•	
Short Wave Pass	•	•	•	
Laser Protection	•	•	•	
Reflective	•	•	•	•
Anti-Reflective	•	•	•	
Neutral Density		•	•	
Polka Dot Beam Splitters	•	•	•	•
Wire Grid Polarizers				
Holographic			•	•
Ruled			•	•
Optical Replication	•	•	•	•
Compact Monochromators	•	•	•	•
Tunable Light Sources	•	•	•	•