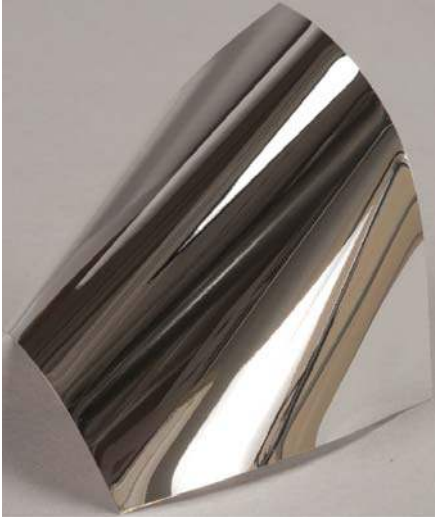


3M™ Specular Film Protected - D50A

Technical Data Sheet

Release A, January 2014



Product Description

3M™ Specular Film - Protected D50A ("SFP-D50A" or "Product") consists of the next generation of 3M's high performance ultra-high reflectivity film, which is greater than 98.5% reflective over the full visible spectrum and all incident angles. SFP-D50A is specially formulated to provide significantly increased lifetime when used in high intensity LED light engines over the standard SFP product. The Product also shows significant lifetime improvement over the standard SFP product for UV irradiance stability.

SFP D50A is coated with a pressure-sensitive adhesive, and has a release liner for easy attachment. A protective coating on the premask side provides abrasion resistance to allow for mild cleaning.

Recommended End Uses

SFP-D50A is particularly well suited as a cavity reflector applique for planar and conical surfaces where attachment with a pressure-sensitive adhesive is desired. The Product is available as a sheet kit and as custom cut shapes.

Key Attributes

- Superior specular reflectivity at >98.5%
- UV and high intensity LED irradiance stability
- Abrasion resistant coating
- Nonconductive 100% polymeric film
- Cut to custom shapes
- Adheres to planar and conical surfaces

Product Characteristics

Typical values for SFP-D50A shown below are based on test data deemed reliable but not warranted, except for those values identified in the Warranted Characteristics section.

Physical

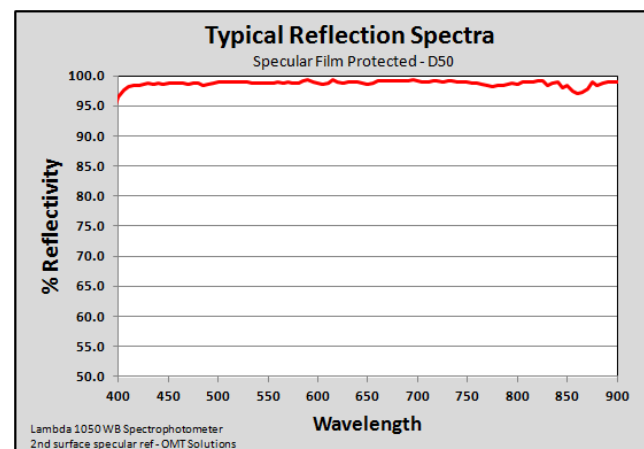
| Characteristic | Value | Test |
|-------------------------------|--------------------------------|------------|
| Total Thickness (with Liners) | 0.0065 in (0.16 mm, 6.5 mils) | Micrometer |
| Film and adhesive only | 0.0045 in (0.11 mm, 4.5 mils) | Micrometer |
| Premask | 0.0012 in (0.030 mm, 1.2 mils) | Micrometer |
| Liners | 0.0008 in (0.020 mm, 0.8 mils) | Micrometer |
| Construction | 100% polymeric | N/A |

Electrical

| | | |
|---------------------|-----------------|----------------|
| Dielectric Strength | 12.0 ± 1.0 (kV) | ASTM D257/D149 |
|---------------------|-----------------|----------------|

Optical

| | | |
|-----------------------|------------|---|
| Photopic Reflectivity | ≥ 98.5% | ASTM E1164/E308 |
| Reflected Color Shift | | |
| CIE a*, b* | 0 ± 2 unit | ASTM E1164/E308 4000K LED or D65, 2° Observer |
| CIE u, v | ≤ 0.001 | |



Operating Temperature Range

Up to 105°C.

Shrinkage At Operating Temperature

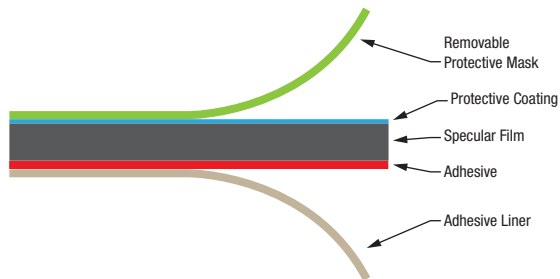
| Characteristic | Value | Test |
|----------------|--------|------|
| 105°C, 15 mins | ≤ 0.5% | 3M |

Environmental Performance

Optical and physical properties stable under these test conditions:

| Cycle | Environment/Duration |
|-----------------------|---|
| Cold Temperature | -40°C 1000 hrs |
| Hot Temperature/Dry | 100°C 1000 hrs |
| Hot Temperature/Humid | 65°C/95% RH, 1000 hrs |
| Thermal Shock | -40°C to 85°C, 100 cycles, 1 hour dwell |
| Total Reflectivity | <0.5% shift |
| ΔE Color Shift | <0.4 |

Product Construction



Suitable Substrates

The user is ultimately responsible for confirming adequate adhesion of SFP-D50A to their substrate. Read Application Instructions below for directions to enhance long term adhesion of SFP-D50A film to your substrate. Tested substrates that are considered suitable: Polycarbonate, ABS, PETG, Acrylic, PVC, Aluminum.

Application Instructions

Refer to Installation Guide for 3M™ Specular Film DF2000MA and 3M™ Specular Film - Protected.

Cleaning

To clean light smudges and fingerprints from SFP-D50A film, use glass cleaner and clean cotton wipes or equivalent. DO NOT apply spray cleaner directly to the reflector surface. Instead, apply spray cleaner to the wipes, and use a gentle circular cleaning motion. The abrasion resistant coating is intended only to protect against light contact. Repeated cleaning could lead to scratches over time.

Recommended Storage Conditions

Store SFP-D50A in its original container, out of direct sunlight, in a clean, dry area, at 40° to 100°F (4° to 38°C), for no more than one year.

Warranted Characteristics

| Characteristic | Value | Test |
|------------------------------------|---------|--|
| Photopic Reflectivity ¹ | ≥ 98.5% | ASTM E1164/E308 |
| Reflected Color Shift CIE u, v | ≤ 0.001 | ASTM E1164/E308 4000K LED or D65, 2° Obs |

¹ - Average of 1ft², spectra acquired using a Perkin Elmer model 1050 and normalized with a traceable specular reference standard from OMT Solutions BV.

Limited Warranty

1. 3M warrants that the Product will have the Warranted Characteristics on the buyer's receipt of Product (the "3M Warranty"). EXCEPT TO THE EXTENT PROHIBITED BY APPLICABLE LAW, THE 3M WARRANTY IS MADE IN LIEU OF ALL OTHER WARRANTIES, RIGHTS OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND THOSE ARISING FROM A COURSE OF DEALING, CUSTOM OR USAGE OF TRADE. THE BUYER IS RESPONSIBLE FOR DETERMINING IF A PRODUCT IS SUITABLE FOR ITS PARTICULAR PURPOSE AND APPLICATION METHODS.

2. For a buyer's convenience, 3M may provide engineering or technical information, recommendations, installation instructions, and other information or materials relating to Product ("Other Product Information"), but 3M makes only the 3M Warranty and does not warranty any Other Product Information.

3. 3M has no obligation under the 3M Warranty as to Product that has been: (a) modified, altered, or processed in any manner; (b) stored, applied, installed, or used in a manner other than that 3M recommends in this Product Bulletin/Technical Data Sheet and in Other Product Information; (c) damaged through contact with a person or thing, misuse, accident, neglect, or other action by anyone other than 3M; or (d) affected by environmental forces or stresses, such as excessive heat or water exposure.

Limited Remedy

If any Product is proven not to have met the 3M Warranty on the buyer's receipt, then the buyer's exclusive remedy, and 3M's sole obligation, will be, at 3M's option, to replace that Product quantity or refund the applicable purchase price.

Limitation of Liability

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