

## DF-PA Blaze & Chill DF-LAM Blaze & Chill

### Product Description

3M DICHROIC Glass Finish DF-PA and 3M DICHROIC Film for Laminated Glass DF-LAM (the "Products") offer a way to create unique, ever-changing color to many interior and exterior building surfaces. Influenced by the color of the substrate, these transparent Products provide a dichroic color effect, meaning they appear to change color when viewed at various angles. The "Blaze" Product shift colors in the warm tones of cyan/blue/magenta in transmission and red/gold color regions of the spectrum in reflection. The "Chill" Product shift colors in the cool tones of blue/magenta/yellow in transmission and gold/green/blue color regions of the spectrum in reflection. The DF-PA Product has a clear, pressure-sensitive adhesive that can be applied to glass. A hard-coated, protective surface layer helps resist scratching during normal use. The DF-PA Product can be used in vertical applications on the surface of interior glass, including the interior of an outside glass wall (the "Interior Applications"), and the exterior of an outside glass wall (the "Exterior Applications").



**Blaze Product: Cyan/Blue/Magenta in transmission at various angles**



**Chill Product: Blue/Magenta/Yellow in transmission at various angles**

# 3M™ DICHROIC Glass Finishes & 3M™ DICHROIC Film for Laminated Glass

## Product Characteristics

The following characteristics are typical values for the Products. These are based on test data deemed reliable, but are not warranted.

Characteristic		DF-PA Blaze	DF-PA Chill
Material	Protective Layer	Hard-coated Polyester	
	Base Film	Multi-layer Polymeric	
	Adhesive	Pressure-sensitive acrylic, permanent	
	Release Liner	Silicone-coated polyester	
Thickness	Film + Adhesive	5.2 mils (132 microns) without Release Liner	5.0 mils (127 microns) without Release Liner
	Release Liner	3.5 mils (89 microns)	
Maximum Roll Size		48 in. X 98.4 ft. (1220mm x 30m)	
Maximum Weight		35 lb. (15.9 kg)	
Film Color		Cyan/Blue/Magenta in transmission Red/Gold in reflection	Blue/Magenta/Yellow in transmission Gold/Green/Blue in reflection

Characteristic		DF-LAM Blaze	DF-LAM Chill
Material	Base Film	Multi-layer Polymeric	
Thickness	Film + Adhesion Promoter	1.4 mils (36 microns)	1.2 mils (30 microns)
Maximum Roll Size		56 in. X 328 ft. (1420mm x 100m)	
Maximum Weight		28 lb. (12.7 kg)	
Film Color		Cyan/Blue/Magenta in transmission Red/Gold in reflection (previously called Copper-Bronze)	Blue/Magenta/Yellow in transmission Gold/Green/Blue in reflection (previously called Gold-Blue)

**NOTE:** Product appearance has an inherent variation in color uniformity as it shifts from one color to the next, including slight color variations across the roll. Product from the same lot of material should be used for each installation location.

## Product Performance

All of the data are calculated as theoretical value and compiled with existing data. Product performance data is based on test data deemed reliable, but not warranted.

Characteristic	DF-PA Blaze	DF-PA Chill
Adhesion 24 hours after application *	Glass 7 lb./in. (33 N/25mm) Acrylic 5 lb./in. (23 N/25mm) Polycarbonate 3 lb./in. (13 N/25mm)	
Fire Resistance	When used in Interior Applications on glass, Products have the National Fire Protection Association Class A (as defined in NFPA 101 "Life Safety Code" Test Method ASTM E84).	

Characteristic	DF-LAM Blaze	DF-LAM Chill
Fire Resistance	Not applicable for interlayer glass	

\* Test specimens were applied to the substrate and conditioned at 68 F (20 C), then peel tested at 180 degree at a tensile speed of 12 inches (300 mm) per minute.

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## Optical Performance Characteristics

Characteristic		DF-PA Blaze	DF-PA Chill
Transmissive Color <sup>1</sup>		Cyan/Blue/Magenta	Blue/Magenta/Yellow
Reflective Color <sup>1</sup>		Red/Gold	Gold/Green/Blue
Spectral Data <sup>2</sup> Left Band Edges Right Band Edges		590nm 795nm	500nm 615nm
Shading Coefficient		0.70	0.77
Solar Heat (%)	Reflectance	25	21
	Transmittance	57	62
	Absorbance	13	15
Visible Light (%)	Reflectance	22	78
	Transmittance	77	17
UV (%)	Transmittance	2.6	2.4

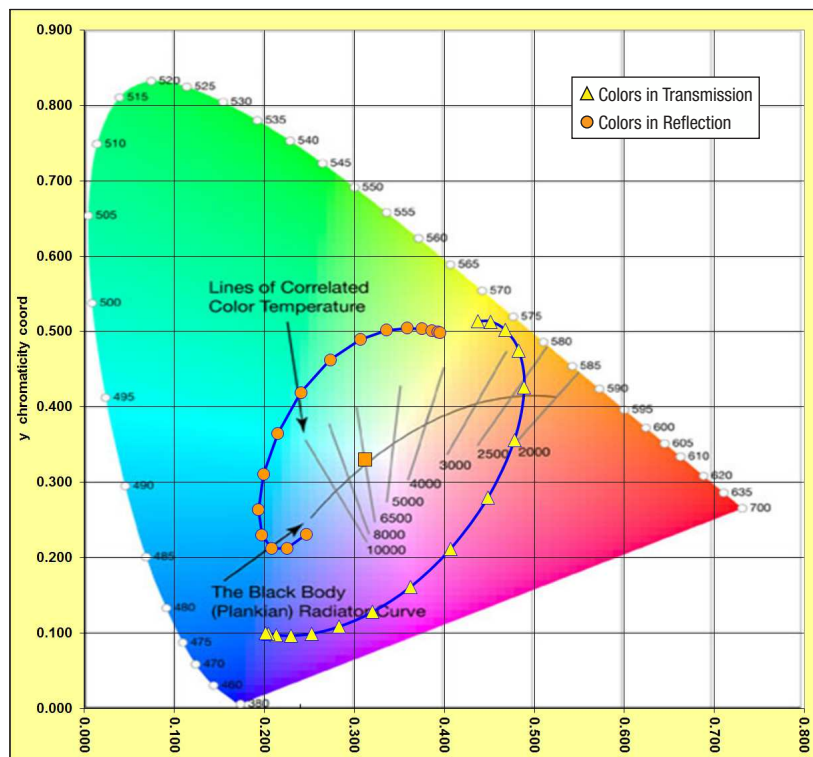
Characteristic		DF-LAM Blaze	DF-LAM Chill
Transmissive Color <sup>1</sup>		Cyan/Blue/Magenta	Blue/Magenta/Yellow
Reflective Color <sup>1</sup>		Red/Gold	Gold/Green/Blue
Spectral Data <sup>2</sup> Left Band Edges Right Band Edges		590nm 795nm	500nm 615nm
Solar Heat Gain Coefficient (SHGC)		0.59	0.61
Solar Heat (%)	Reflectance	29	29
	Transmittance	55	56
	Absorbance	17	15
Visible Light (%)	Reflectance	29	89
	Transmittance	71	11
Total Solar Energy Rejection (TSER)(%)		41	39

1. Varies by viewing angle. Color shift is visible from both sides of the Product.

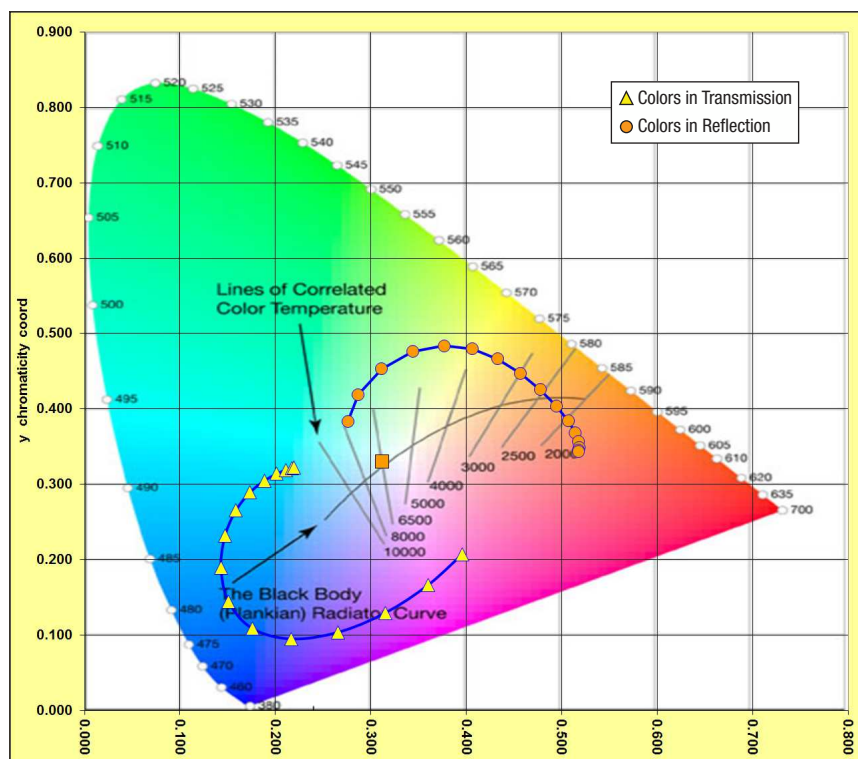
2. ASTM Test: E1164-94 / E387-95

# 3M™ DICHROIC Glass Finishes & 3M™ DICHROIC Film for Laminated Glass

Typical Spectral Response for DF-PA Chill Product



Typical Spectral Response for DF-PA Blaze Product



# 3M™ DICHROIC Glass Finishes & 3M™ DICHROIC Film for Laminated Glass

## Product Use

The user is solely responsible for evaluating and determining whether these 3M Products are suitable and appropriate for any particular use or manufacturing process in which they may be used.

**NOTE:** 3M DICHROIC Film DF Blaze and Chill Products are intended for general decoration and are different from DF-PA and DF-LAM Products. DF Film Products are not intended for application to glass, or where UV or abrasion resistance is needed. (See technical data sheet for 3M DICHROIC Film DF Blaze and Chill)

## Application and Removal Guidelines

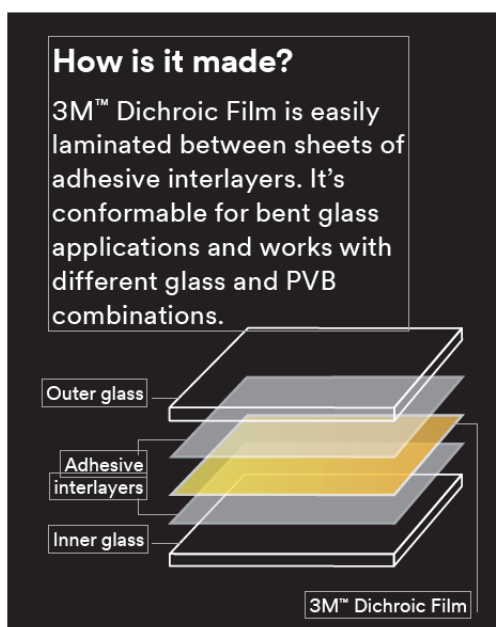
Avoid scratching, denting, or stretching the Product during installation.

The values in these tables are typical, and are based on test data deemed reliable but are not warranted. See the 3M DICHROIC DF-PA Glass Finishes Installation Guide and the 3M DICHROIC Film for Laminated Glass DF-LAM Installation Guide for additional information.

Characteristic	DF-PA Blaze & Chill	DF-LAM Blaze & Chill
Application Surface Type	Flat	Flat or bent glass
Application Surface Material	Glass, acrylic, polycarbonate	Interlayer glass (see installation guide)
Application Location	Interior Applications, including interior perimeter glass	Interior and exterior applications
Application Temperature	54°F - 100°F (12°C - 38°C) air and application surface	Autoclave (see installation guide)
Application Method	Wet application	Laminated using Interlayer adhesives
Applied Product Shrinkage	Nominal	See installation guide
Applied Product Exposure Temperature	-40°F - +149°F (-40°C - +65°C)	-40°F - +149°F (-40°C - +65°C)
High Humidity Environments	Products are not recommended for Interior Applications where condensation consistently occurs.	Products can be used in high humidity environments as Interlayer glass
Product Removal	Low heat, or 3M Adhesive Remover Citrus Base and scraper	Permanent - not removable

**NOTE: For DF-PA only:** removing the Product too quickly can result in excessive adhesive left on the substrate. If necessary, heat a small section of the film with a hair dryer to soften the adhesive, peel back slowly, then heat and remove the next section.

**Figure 1.** Interlayer glass application of DF-LAM





# 3M™ DICHROIC Glass Finishes & 3M™ DICHROIC Film for Laminated Glass

## Processing Options

### Printing

The DF-PA Product is not designed for printing on the surface. If the customer chooses to print on the Product, the customer must test and approve with their equipment to determine suitability.

The DF-LAM Product has a printable surface. If the customer chooses to print on the Product, the customer must test and approve with their equipment to determine suitability.

### Electronic Cutting

The DF-PA Product is believed to be suitable for use with most electronic cutting equipment, but the customer must test and approve with their equipment to determine suitability.

The DF-LAM Product is believed to be suitable for electronic cutting prior to lamination, but the customer must test and approve with their equipment to determine suitability.

## Shelf Life and Storage

### Shelf Life

Apply the Products within 2 years of the date of purchase. The storage conditions specified in this document must be maintained for full shelf life.

### Storage Conditions

- 40°F - 90°F (4°C - 32°C)
- Away from direct sunlight and high humidity
- Clean, dry area
- Original container with end caps, in the plastic sleeve, stored horizontally, a maximum of 6 cartons high
- Bring the Product to room temperature before application

## Cleaning and Maintenance

**NOTE:** The DF-PA Product may be cleaned beginning 30 days after installation as follows:

Regular cleaning will help maintain the Product's appearance. Use only clean, nick-free tools and wipe gently only in one direction. Do not use ammonia, chlorine, or organic-based cleaning products, polishing or cleaning compound, sponges, brushes or electric polishing equipment.

- If there is dust and grit, wipe it off with a soft, damp cloth.
- If it is soiled, but not gritty, use water and squeegee.
- If there is heavier soil, use a mild liquid detergent and water solution, then clear water, and wipe gently with a cloth wipe.

**NOTE:** The DF-LAM Product may be cleaned using standard glass cleaning methods when applied as Interlayer glass.

### Expected Performance Life

DF-PA Application		Expected Performance Life - Vertical Applications
Interior Applications	Excluding building perimeter glass	10 years
	Building perimeter glass	7 years
Exterior application surfaces		5 years
Plastic application surfaces		Not warranted

DF-LAM Application		Expected Performance Life - Vertical Applications
Interior Applications	Excluding building perimeter glass	7 years
	Building perimeter glass	5 years
Exterior applications		5 years

\* The DF-LAM product must be used with an interlayer adhesive having at least 99% UV protection.

# 3M™ DICHROIC Glass Finishes & 3M™ DICHROIC Film for Laminated Glass

## Health and Safety

### CAUTION

When handling any chemical products, read the manufacturers' container labels and the Safety Data Sheets (SDS) for important health, safety and environmental information. To obtain SDS sheets for 3M products go to [3M.com/SDS](https://www.3m.com/SDS), or by mail or in case of an emergency, call 1-800-364-3577 or 1-651-737-6501.

When using any equipment, always follow the manufacturers' instructions for safe operation.

### WARNING

#### **To reduce the risks of personal injury and/or property damage associated with glass breakage:**

A glass surface covered by a film with areas of high opacity or dark-colored ink will absorb more heat than other glass surfaces when exposed to sunlight. Heat absorption can create thermal expansion that could result in glass breakage or cracking. Do not use a film with areas of high opacity or dark-colored ink on glass surfaces with significant exposure to sunlight.

## Technical Information

Technical information and data, recommendations, and other statements provided by 3M are based on information, tests, or experience which 3M believes to be reliable, but the accuracy or completeness of such information is not guaranteed. Such technical information and data are intended for persons with knowledge and technical skills sufficient to assess and apply their own informed judgment to the information. The typical values shown should not be used for the purpose of specification limits. If you have questions about this Product, contact the Technical Service helpline at 1-888-650-3497.

# 3M™ DICHROIC Glass Finishes & 3M™ DICHROIC Film for Laminated Glass

## LEEDv4 Credits

This section describes some of the options for acquiring LEED credits using 3M™ DICHROIC Glass Finishes DF-PA. LEED credits do not apply for 3M™ DICHROIC Film for Laminated Glass DF-LAM.

**NOTE:** Each application is different. It is the sole responsibility of the end user to evaluate and determine whether LEED credits can be acquired.

### ID+C MR Credit, Interiors Life-Cycle Impact Reduction

- Option 1: Interior Reuse - Product can be used to refinish salvaged, refurbished, or reused building materials

### ID+C, BD+C EQ Credit, Daylight

- Product can be used to enable daylight in enclosed spaces

### BD+C MR Credit, Building Life-Cycle Impact Reduction

- Option 3: Building and Material Reuse - Product can be used to refinish salvaged, refurbished, or reused building materials

### O+M MR Credit, Purchasing - Facility Maintenance and Renovation

- Product can be used to refinish salvaged, refurbished, or reused building materials
- Product has been tested to and is in compliance with the General Emissions Evaluation (California Department of Public Health (CDPH) Standard Method V1.1-2010)

## BUILDING PRODUCT DISCLOSURE AND OPTIMIZATION INFORMATION

### Environmental Product Declaration (EPD) or Life Cycle Analysis (LCA)

EPD and/or LCA information not available.

### Raw Material Source and Extraction Reporting

Raw Material source and extraction information for this product is considered to be 3M confidential and is therefore not available.

### Extended Producer Responsibility

Take-back or recycling program for this product is not available.

### Bio-based Materials

Product have not been tested to ASTM D6866.

### Wood Products

Product does not contain wood-based materials.

### Materials Reuse

Product can be used to refinish salvaged, refurbished, or reused building materials.

### Recycled Content

Product does not contain pre- or post-consumer recycled content.



# 3M™ DICHROIC Glass Finishes & 3M™ DICHROIC Film for Laminated Glass

## WARRANTY

### Products

3M DICHROIC Glass Finishes DF-PA Chill and DF-PA Blaze, and 3M DICHROIC Film for Laminated Glass DF-LAM Chill and DF-LAM Blaze (the "Products").

### 3M Basic Product Warranty

The Product(s) specified in this document are warranted to be free of defects in materials and manufacture ("3M Basic Product Warranty") at the time of shipment ("Warranty Period") by 3M or its authorized distributor.

### Limited Warranty

- For Products used in Applications in the continental United States, 3M makes the following warranty (the "3M Limited Warranty") for the applicable time period stated below ("Warranty Period"), which will begin on the earlier of: (a) Product installation date; or (b) six months after 3M's Product shipment date.

The Product(s) will maintain their color changing properties and will have no significant discoloration, cracking or other similar visual defects for the applicable time period below:

DF-PA Application		Warranty Period - Vertical Applications
Interior Applications	Excluding building perimeter glass	7 years
	Building perimeter glass	5 years
Exterior application surfaces		5 years
Plastic application surfaces		Not warranted

DF-LAM Application		Warranty Period - Vertical Applications
Interior Applications	Excluding building perimeter glass	5 years
	Building perimeter glass	3 years
Exterior applications		3 years

\* The DF-LAM product must be used with an interlayer adhesive having at least 99% UV protection.

- 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 Basic Product Warranty and the 3M Limited Warranty and does not warrant any Other Product Information.
- 3M has no obligation under the 3M Basic Product Warranty or the 3M Limited 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 document and in all Other Product Information; (c) damaged through contact with a person or thing, misuse, accident, neglect, or other action by anyone other than 3M; (d) improperly installed, including, without limitation, installation after the expiration of the Product's shelf life or installation without proper surface preparation, or (e) exposed to excessive heat, humidity, dirt or UV light.
- EXCEPT TO THE EXTENT PROHIBITED BY APPLICABLE LAW, THE 3M BASIC PRODUCT WARRANTY AND 3M LIMITED WARRANTY ARE MADE IN LIEU OF ALL OTHER WARRANTIES, RIGHTS OR CONDITIONS, EXPRESS OR IMPLIED, STATUTORY OR OTHERWISE, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY, SATISFACTORY QUALITY, 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 ITS APPLICATION METHODS.
- 3M must receive any 3M Basic Product Warranty or 3M Limited Warranty claim in writing no later than 10 business days after (a) the end of the Warranty Period or (b) the discovery of the 3M Warranty claim, whichever is earlier.

# 3M™ DICHROIC Glass Finishes & 3M™ DICHROIC Film for Laminated Glass

## WARRANTY (continued)

### Limited Remedy

IF ANY PRODUCT IS PROVEN NOT TO HAVE MET THE 3M BASIC PRODUCT WARRANTY OR THE 3M LIMITED WARRANTY DURING THE WARRANTY PERIOD, THEN THE BUYER'S EXCLUSIVE REMEDY, AND 3M'S SOLE OBLIGATION, WILL BE, AT 3M'S OPTION, TO REPLACE THE NONCONFORMING PRODUCT OR TO REFUND THE NONCONFORMING PRODUCT'S PURCHASE PRICE.

### No Extension of Warranty

In the case of an approved warranty claim, the replacement Product will carry only the remaining term of the original warranty period.

### Limitation of Liability

3M WILL NOT UNDER ANY CIRCUMSTANCES BE LIABLE TO A BUYER FOR DIRECT (other than the Limited Remedy stated above), SPECIAL, INCIDENTAL, INDIRECT OR CONSEQUENTIAL DAMAGES (INCLUDING, WITHOUT LIMITATION, LOSS OF PROFITS) IN ANY WAY RELATED TO THE PRODUCT, THE TECH DATA SHEET OR OTHER PRODUCT INFORMATION, REGARDLESS OF THE LEGAL OR EQUITABLE THEORY ON WHICH SUCH DAMAGES ARE SOUGHT.

#### Commercial Solutions

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