

# 3M™ Contrast Enhancement Film

## CEF19XX Auto Series

### Product Description

3M™ Contrast Enhancement Films (CEF) are specialized optically clear adhesives offering superior clarity and excellent adhesion to various transparent display substrates. 3M CEF19XX Auto film is recommended for applications that require low dielectric constant for direct LCM bonding, ITO compatibility and high adhesion. 3M CEF19XX Auto is UV curable.



### Construction

Product	3M CEF1902 film Auto	3M CEF1904 film Auto	3M CEF1905 film Auto	3M CEF1906 film Auto
Adhesive Type:	Acrylic	Acrylic	Acrylic	Acrylic
Adhesive Carrier:	None	None	None	None
Approximate Thickness:				
Release Liner:	50 um (2.0 mils) Clear Polyester	50 um (2.0 mils) Clear Polyester	50 um (2.0 mils) Clear Polyester	50 um (2.0 mils) Clear Polyester
Adhesive:	50 um (2.0 mils)	100 um (4.0 mils)	125 um (5.0 mils)	150 um (6.0 mils)
Release Liner:	75 um (3.0 mils) Clear Polyester	75 um (3.0 mils) Clear Polyester	75 um (3.0 mils) Clear Polyester	75 um (3.0 mils) Clear Polyester

Product	3M CEF1907 film Auto	3M CEF1908 film Auto	3M CEF1910 film Auto
Adhesive Type:	Acrylic	Acrylic	Acrylic
Adhesive Carrier:	None	None	None
Approximate Thickness:			
Release Liner:	50 um (2.0 mils) Clear Polyester	50 um (2.0 mils) Clear Polyester	50 um (2.0 mils) Clear Polyester
Adhesive:	175 um (7.0 mils)	200 um (8.0 mils)	250 um (10.0 mils)
Release Liner:	75 um (3.0 mils) Clear Polyester	75 um (3.0 mils) Clear Polyester	75 um (3.0 mils) Clear Polyester

## Typical Physical Properties and Performance Characteristics

**Note:** The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

### Environmental Performance:

The following environmental test was conducted in the 3M laboratory under the conditions specified without any appreciable deterioration in visible appearance (no bubbles, delamination, etc.). Sample construction is LCD glass/3M CEF1904 film Auto/LCD glass, cured 3J/cm<sup>2</sup>

Condition	Haze	b*
Initial	0.1%	0.51
85C/85%RH	0.3%	0.55

### Peel Adhesion:

ASTM D3330 modified, 180 degree peel from float glass, 1 cm wide peel strips, 12 in/min (305 mm/min), 2.0 mil polyester backing, 3M CEF19XX film Auto cured 3J/cm<sup>2</sup>

Dwell Time	Peel Adhesion to Glass	
	20 min dwell at 25°C/50%RH	3 days dwell at 25°C/50%RH
Units	N/cm	N/cm
3M CEF1902 film Auto	8.5	11.4
3M CEF1904 film Auto	9.8	13.7
3M CEF1906 film Auto	12.3	14.6
3M CEF1910 film Auto	14.1	16.1

**Color:**

Ultra Scan Pro (Hunter Lab), ASTM E308, D65/10°. 3M CEF19XX Auto film on LCD glass, uncured.

3M CEF1902 film Auto	3M CEF1904 film Auto	3M CEF1906 film Auto	3M CEF1910 film Auto
L* = 96.9	L* = 96.9	L* = 96.9	L* = 96.9
a* = -0.01	a* = -0.03	a* = -0.03	a* = -0.05
b* = 0.16	b* = 0.16	b* = 0.21	b* = 0.21

**Refractive Index:**

3M CEF19XX Auto film uncured and cured (3J/cm<sup>2</sup>)  
 (+ 0.0005 Metricon measurements)

3M CEF19XX film Auto			
	405 nm	532 nm	633 nm
Uncured	1.4891	1.4769	1.4719
Cured	1.4877	1.4759	1.4710

**Haze:**

Haze is measured according to ASTM D1003-92.  
 3M CEF19XX Auto film on LCD glass, uncured

3M CEF1902 film Auto	3M CEF1904 film Auto	3M CEF1906 film Auto	3M CEF1910 film Auto
0.1%	0.1%	0.2%	0.5%

**Transmission Curve:**



**Typical Electrical Properties at Room Temperature**

ASTM-D150-92, 3M CEF19XX film Auto cured 3J/cm<sup>2</sup>

**Dielectric Constant:**

3M CEF19XX film Auto	
Frequency (kHz)	Dielectric Constant
100	2.62
500	2.52

## Suggested Lamination Process

Step 1: Remove secondary liner, then laminate 3M CEF19XX Auto film to first adherent substrate by roller at room temperature

Recommendation: roller pressure 0.1 – 0.2 MPa, roller speed 0.5 – 1 m/min

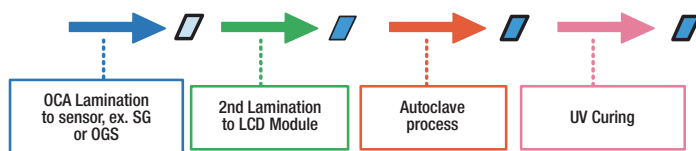
Step 2: Remove primary liner, then laminate 3M CEF19XX film/first adherent to second adherent by vacuum lamination

Recommendation: Vacuum condition < 50 Pa, pressure around 0.1 – 0.2 MPa

Step 3: Autoclave process

Recommendation: 30-60C/3-5kgf/cm<sup>2</sup>/20-30min

Step 4: UV curing with minimum 3J/cm<sup>2</sup> dosage (UVA)



## UV Cure Guidance

- UV range: 340-375nm (max absorption = 342nm)
- Minimum UV dosage and intensity: 3 J/cm<sup>2</sup>, 10 mW/cm<sup>2</sup>
- Suggest using lower wavelengths of the UV-A spectra.
- Suitable UV sources would be Fusion D bulb and med pressure Hg.
- LED sources, which output at longer UV-A wavelengths would be less ideal.

## Storage

- Avoid applying pressure or resting objects on the product to prevent marking, denting, or deforming the surface.
- Wear gloves to prevent fingerprints or nail marks when handling.
- Product needs to be unpacked and handled in the clean-room facility.



### 3M Display Materials & Systems Division

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- Product must be protected from light exposure.
- Store in sealed, foil bag under -20°C to 30°C and less than 70% relative humidity. If removed from cold storage, ensure no condensation on packaging

## Regulatory

For regulatory information about this product, please contact your 3M representative.

## Technical Information

The technical information, recommendations and other statements contained in this document are based upon tests or experience that 3M believes reliable, but the accuracy or completeness of such information is not guaranteed.

## Product Use

Many factors beyond 3M's control and uniquely within the user's knowledge and control can affect the use and performance of a 3M product in a particular application. Given the variety of factors that can affect the use and performance of a 3M product, user is solely responsible for user's method of application.

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