

# 3M™ Contrast Enhancement Film

## CEF19XX Series

- Low dielectric constant
- Excellent durability in reliability testing
- High conformability to surfaces steps

### 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 film is recommended for applications that require low dielectric constant for direct LCM bonding, ITO compatibility and high adhesion. 3M CEF19XX is UV curable.



### Construction

Product	3M CEF1902	3M CEF1904	3M CEF1905	3M CEF1906
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

The 3M family of optically clear adhesives for electronic displays are usually available in two forms. 3M OCA come in roll good form. 3M Contrast Enhancement Films (CEF) are available in die-cut form.

Product	3M CEF1907	3M CEF1908	3M CEF1910
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/LCD glass, cured 3J/cm<sup>2</sup>

	Condition	Duration
High Temperature	+85°C	1000 hours
Low Temperature	-40°C	1000 hours
High Temp/Humidity	65°C/90%	1000 hours
UV	0.55 W/m <sup>2</sup> at 340 nm	500 hours

### 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 cured 3J/cm<sup>2</sup>

Peel Adhesion to Glass		
Dwell Time	20 min dwell at 23°C/50%RH	3 days dwell at 23°C/50%RH
Units	N/cm	N/cm
3M CEF1902	8.5	11.4
3M CEF1904	9.8	13.7
3M CEF1906	12.3	14.6
3M CEF1910	14.1	16.1

**Color:**

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

3M CEF1902	3M CEF1904	3M CEF1906	3M CEF1910
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 uncured and cured (3J/cm<sup>2</sup>) (+ 0.0005 Metricon measurements)

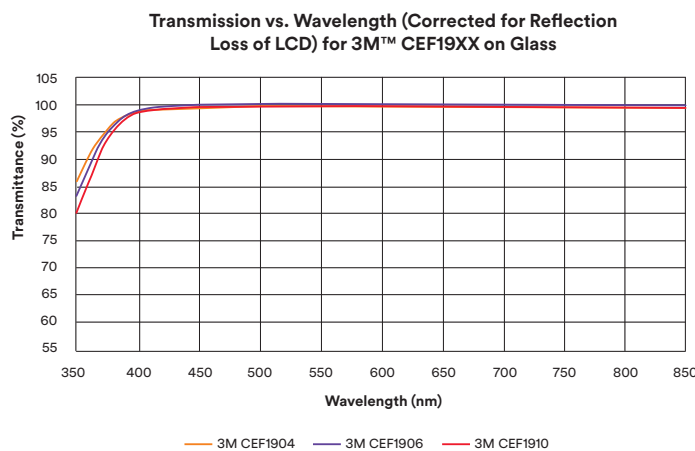
3M CEF19XX			
	405 nm	532 nm	633 nm
Uncured	1.4891	1.4769	1.4719
Cured	1.4877	1.4759	1.4710

**Haze:**

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

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

**Transmission Curve:**



**Typical Electrical Properties at Room Temperature**

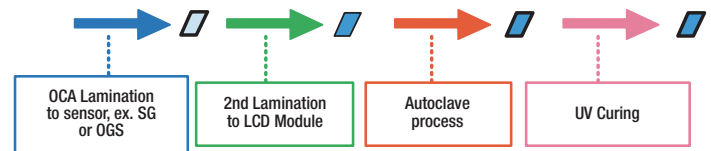
ASTM-D150-92, 3M CEF19XX cured 3J/cm<sup>2</sup>

**Dielectric Constant:**

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

**Suggested Lamination Process**

- Step 1: Remove secondary liner, then laminate 3M CEF19XX 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/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: 30-60°C/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 medium 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 a clean-room facility.
- 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

## 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.

## Regulatory

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

## 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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