3M™ Optically Clear Adhesives
8211 · 8212 · 8213 · 8215

Product Description
3M™ Optically Clear Adhesives (OCA) are highly specialized optically clear free-film adhesives offering superior clarity and excellent adhesion to various types of transparent substrates. 3M OCAs are easy to convert and are contaminant-free, resulting in improved bubble resistance in laminations exposed to high temperature and high humidity. Common applications include displays, touch panels and others requiring an optically clear bond.

3M™ Optically Clear Adhesives 8211 / 8212 / 8213 / 8215
3M OCA 8211, 8212, 8213 and 8215 are for use in general purpose applications including display touch applications where very high adhesion is critical.

Construction

<table>
<thead>
<tr>
<th>Products</th>
<th>8211</th>
<th>3M™ Optically Clear Adhesive 8212</th>
<th>8213</th>
<th>8215</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adhesive Type:</td>
<td>Acrylic</td>
<td>Acrylic</td>
<td>Acrylic</td>
<td>Acrylic</td>
</tr>
<tr>
<td>Adhesive Carrier:</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Approximate Thickness:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Release Liner</td>
<td>2.0 mil (50 micron) Polyester</td>
<td>2.0 mil (50 micron) Polyester</td>
<td>2.0 mil (50 micron) Polyester</td>
<td>2.0 mil (50 micron) Polyester</td>
</tr>
<tr>
<td>Adhesive</td>
<td>1.0 mil (25 micron)</td>
<td>2.0 mil (50 micron)</td>
<td>3.0 mil (76 micron)</td>
<td>5.0 mil (125 microns)</td>
</tr>
<tr>
<td>Release Liner</td>
<td>2.0 mil (50 micron) Polyester</td>
<td>2.0 mil (50 micron) Polyester</td>
<td>2.0 mil (50 micron) Polyester</td>
<td>2.0 mil (50 micron) Polyester</td>
</tr>
</tbody>
</table>
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.

Optical Performance to Environmental Conditions:

3M™ Optically Clear Adhesives have withstood the following environmental tests conducted in the 3M laboratory under the conditions specified without any appreciable deterioration in visible appearance, physical integrity or optical performance. Over the entire test duration there was no significant change in transmission over the visible spectrum.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Temperature</td>
<td>+85°C</td>
</tr>
<tr>
<td>Low Temperature</td>
<td>-40°C</td>
</tr>
<tr>
<td>High Temp/Humidity</td>
<td>+65°C / 95% R.H.</td>
</tr>
<tr>
<td>Thermal Shock</td>
<td>One hour at -40°C followed by one hour at +85°C</td>
</tr>
<tr>
<td>UV</td>
<td>WRC Cycle #4-15</td>
</tr>
</tbody>
</table>

Peel Adhesion:
ASTM D3330 modified, 180 degree peel, 12 in./min.
305 mm/min. 2.0 mil polyester to various surfaces.

Shear Adhesion:
ASTM D-3654 Procedure H
1/2" x 1" Overlap, minutes to failure.

Color:
ASTM E 1164-07 / CIELAB
(BYK Gardner TCS Plus Spectrophotometer, Model 8870)
Typical Physical Properties and Performance Characteristics (continued)

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

Refractive Index:

(± 0.0005 measured for Sodium D line @ 25°C)

<table>
<thead>
<tr>
<th></th>
<th>8211</th>
<th>3M™ Optically Clear Adhesive</th>
<th>8212</th>
<th>8213</th>
<th>8215</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.473</td>
<td>1.475</td>
<td>1.473</td>
<td>1.473</td>
<td>1.473</td>
</tr>
</tbody>
</table>

Haze:

Haze was measured according to ASTM D1003-92

<table>
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<th>8215</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.1%</td>
<td>0.6%</td>
<td>0.4%</td>
<td>0.8%</td>
<td></td>
</tr>
</tbody>
</table>

Transmission:

ASTM E903, D1003, and E284

We calculate internal transmittance by correcting sample Transmittance (TLT) for the sample Reflectance (TLR) in accord with the definition of internal transmittance ($\tau_i$) found in ASTM E284. This measurement is meant to show whether the sample has any absorptance in the visible range of the spectrum. A perfect sample with no absorptance would have a value of $\tau_i = 100$ percent (± error of measurements, typically ± 0.5 %).

$$\text{Internal Transmittance} \ (\% \tau_i \text{ or } \text{TLT}_i) \text{ is calculated as follows:}$$

$$\text{Transmittance vs. Wavelength}$$

![Graph of 3M™ Optically Clear Adhesive 8211](image1)

![Graph of 3M™ Optically Clear Adhesive 8212](image2)

![Graph of 3M™ Optically Clear Adhesive 8213](image3)

![Graph of 3M™ Optically Clear Adhesive 8215](image4)
3M™ Optically Clear Adhesives 8211 • 8212 • 8213 • 8215

Typical Physical Properties and Performance Characteristics (continued)

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

**Chemical Resistance:**
When properly applied, 3M™ Optically Clear Adhesives can withstand splashes of numerous chemicals including acetone, isopropyl alcohol, and cleaners.

**Water Resistance:**
Immersion in water has no appreciable effect on the bond strength at room temperature.

**Relative Temperature Resistance:**
- Short Term High Temperature: 350°F (177°C)
- Long Term High Temperature: 185°F (85°C)
- Long Term Low Temperature: -40°F (-40°C)

**Shelf Life:**
Product retains its performance and properties for two years from date of manufacture if properly stored at room temperature conditions of 72°F (22°C) and 50% relative humidity. Storage in a plastic bag is recommended.

**Application Techniques**
For maximum bond strength the surface should be thoroughly cleaned and dried. To obtain greatest benefit, laminations should be done in a class 10,000 cleanroom or better and using equipment with static charge elimination.

Bond strength can be improved with firm application pressure and moderate heat causing the adhesive to develop intimate contact with the bonding surface.

Maximum bond strength is achieved after 72 hours of dwell time.

**Available Sizes**

<table>
<thead>
<tr>
<th>Available Lengths (subject to minimum order requirements):</th>
<th>180 yards or 540 feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum length - 3M™ Optically Clear Adhesives 8211, 8212, 8213 and 8215</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Available Widths (subject to minimum order requirements):</th>
<th>60 inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum width - 3M™ Optically Clear Adhesives 8211, 8212, 8213 and 8215</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Normal Slitting Tolerance</th>
<th>± 1/32 in. (0.8 mm)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Core Size</th>
<th>3.0 in. (76.2 mm)</th>
</tr>
</thead>
</table>

**General Information**
- Light transmission >99% when corrected for reflection losses.
- Non-birefringent when removed from carrier film.
- High temperature, humidity, and UV resistance.
- Long term durability without yellowing, delaminating, or degrading.
- High cohesive and peel strength for reliably bonding most transparent substrates.
- 3M™ Optically Clear Adhesives 8211, 8212, 8213 and 8215 are coated and converted in a clean room.
- 3M optically clear adhesives are inspected to reduce the occurrence of bubbles, dirt, gels and other optical distortions.
- Wound on plastic cores and wrapped in plastic to eliminate paper fiber contamination.
- Two film liners for optimum adhesive smoothness and differential release for ease of processing and protection from contamination.
- Available in roll goods only.
Application Ideas

- Touchscreens- for bonding film and glass laminates.
- Transparent graphic overlays.
- Projection screens.

Processing:

Laminating

Recommended nip roll or roller platen press type laminator to maintain optical aesthetics when laminated. Hand lamination not advised. Use best process control standards possible to control variables. (See 3M Laminating Technical Bulletin for additional information.)

Certification/Recognition

MSDS: 3M has not prepared a MSDS for these products which are not subject to the MSDS requirements of the Occupational Safety and Health Administration’s Hazard Communication Standard, 29 C.F.R. 1910.1200(b)(6)(v). When used under reasonable conditions or in accordance with the 3M directions for use, these products should not present a health and safety hazard. However, use or processing of the product in a manner not in accordance with the directions for use may affect their performance and present potential health and safety hazards.

TSCA: These products are defined as articles under the Toxic Substances Control Act and therefore, are exempt from inventory listing requirements.

RoHS: These products comply with the requirements of EU Directive 2002/95/EC and 2005/618/EC.

For Additional Information


Important Notice

All statements, technical information, and recommendations related to 3M’s products are based on information believed to be reliable, but the accuracy or completeness is not guaranteed. Before using this product, you must evaluate it and determine if it is suitable for your intended application. You assume all risks and liability associated with such use. Any statements related to the product which are not contained in 3M’s current publications, or any contrary statements contained on your purchase order shall have no force or effect unless expressly agreed upon, in writing, by an authorized officer of 3M.

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