The most reliable partner in business
The most honorable partner
The company loved by all, TDL
Composition & Application of Protective Film

Application process of protective film

LGP original mounting plate protective film

Extrusion of LGP original mounting plate protective film → Cutting (Processing)

Release of protective film from the pattern-finished surface → Release of protective film from the raw-material plate

Inspection

LGP laminating protective film

Washing → LGP laser pattern

Laminating → Packing and shipment

Applications of LGP Protective Film

LGP original mounting plate protective film

This high-strength CPP-series film is used as the LGP original mounting plate protective film that requires high adhesion for the postprocessing (cutting) by inch after laminating.

LGP laminating protective film

After the LGP pattern processing, the low-strength LDPE-series film is used as the laminating film that requires low adhesion because of not undergoing postprocessing (cutting).
Optical Protective Film (for LGP and PMMA)

Optical (EVA, Metalloocene self-adhesion)
There is a self-adhesion film (EVA, Metalloocene) and a coating film that are used to prevent surficial foreign matters and scratch for LCD panel, LGP, mobile, glass, and ITO.

SPEC.

<table>
<thead>
<tr>
<th></th>
<th>Width</th>
<th></th>
<th>Length</th>
<th></th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>90~800 mm</td>
<td></td>
<td>200~3,000 M</td>
<td></td>
<td>0.04~0.15 mm</td>
</tr>
</tbody>
</table>

Our main product is the LGP protective film, which is fully and solely supplied to LGP processors for Samsung and LG. Aside from that, we are now developing and supplying LGP original mounting plate protective film. It is a global trend to use Chinese price-competitive products, but Korean products have higher quality without surficial foreign matters, carbide, or gel. At present, we remain as a top company with the price competitiveness.

Reliability review date by “S” company

Optical (EVA, Metalloocene self-adhesion)
Optical Protective Film (for ITO)

No adhesive type with adhesive power
It is easy to control the adhesive power, making it applicable to ITO film protection and LCD touchscreen. Also, its excellent thermal resistance and durability diversify its applications.

- High in strength with the three-layer structure
- No transferal of adhesive
- Easy-to-control adhesive power
- Cost savings
- Foreign matter control through clean equipment production.
- Eco-friendly

**TECHNICAL DATA**

<table>
<thead>
<tr>
<th>Product no.</th>
<th>T-T30E</th>
<th>Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base film</td>
<td>Polyethylene film</td>
<td>KS A 1107</td>
</tr>
<tr>
<td>Type of adhesive</td>
<td>Self Adhesive</td>
<td>TMC METHOD</td>
</tr>
<tr>
<td>Thickness μm</td>
<td>30</td>
<td>KS M 3509</td>
</tr>
<tr>
<td>180° Peel strength gf/25mm</td>
<td>2.5</td>
<td>Haze meter</td>
</tr>
<tr>
<td>Tensile strength N/cm²</td>
<td>2000</td>
<td>In-line foreign matter detector</td>
</tr>
<tr>
<td>Elongation %</td>
<td>600</td>
<td></td>
</tr>
<tr>
<td>Haze %</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Gel/particle EA/4000m</td>
<td>0.5-0.6 mm : 1,800 or lower</td>
<td>30 or lower</td>
</tr>
<tr>
<td></td>
<td>0.6-0. mm : 1,100 or lower</td>
<td>250 or lower</td>
</tr>
<tr>
<td></td>
<td>0.7 mm or thicker : 90 or lower</td>
<td>30 or lower</td>
</tr>
</tbody>
</table>

Tempered Glass Processing Protective Film

- **Product Structure**

- **Intended Use and Features**
  - **Intended Use**: Cutting processing and transportation after lamination on a tempered-glass raw-material plate
  - **Features**: Minimized change on standing, low transferal and transduction effects, and great cutting characteristics

- **Applications**
  - **Cutting OK after laminating - TDL**: Outstanding adhesion and cutting characteristics
  - **Cutting failure after laminating - Other**: Insufficient adhesion and cutting characteristics

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**SPEC.**

<table>
<thead>
<tr>
<th>Thickness</th>
<th>30μm ± 5μm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adhesive</td>
<td>1g ± 0.5g</td>
</tr>
<tr>
<td>Color</td>
<td>Haze</td>
</tr>
<tr>
<td>Length</td>
<td>~ 2,000M</td>
</tr>
<tr>
<td>Width</td>
<td>~ 1,800mm</td>
</tr>
</tbody>
</table>
Composition and Application of Buffer Sheet

**LCD panel production process**

- **Liquid crystal production**
  - Color Filter* TFT substrate
  - LCD glass (panel) production

- **Scriber process**
  - Cutting large glass panel by inch

- **CP process**
  - Polarizing film
  - Glass liquid crystal
  - Polarizing film
  - Glass liquid crystal + Polarizing film with light protection film laminated

- **LCM process**
  - Glass Liquid Crystal
  - IC Chip
  - PCB
  - Chip attachment for the display

- **A’ssy process**
  - Completion of LCD, LED, or OLED TV/monitor/table/mobile

- **BLU process**
  - LCM liquid crystal + BLU + Top chassis assembly process
  - Production of fluorescent light for illumination

**LCD panel bonding process**

- **Bonding Tool**
  - With the high-temperature/pressure bonding equipment, the tool is moved up & down to react ACF and to connect IC and panel.

- **Anisotropic Conductive Film, ACF**
  - Reinforced conductive and adhesive film that is essential for a module production to connect/bond the circuit between the screen panel and the actuation circuit / IC for a flat panel display.

**TBS**
- Stable dimensions in high temperature and pressure settings
- There will be a little change in physical properties.
- It will be advantageous in repetitive compression.
- Buffer power will be high to protect IC/panel.
- There will be a good release between ACFs.
- There will be no environmentally harmful elements.
Module Bonding Sheet - PI TYPE

**COG, FOG, OLB Bonding**

The buffer sheet is composed of heat-resistant PI film and silicone and is used to attach the driver and PCB ass'ys using ACF in LCD, PDP, or OLED module process (LCM process). It protects TCP and PCB from the heating tool while helping the conduction of heat. Because of this, it is widely used for semiconductor and electronic parts that require insulation, heat resistance, and high thermal conductivity.

By integrating the PI film and silicone composite with a little change of dimensions and physical properties in high temperature and pressure conditions, it minimizes deformation due to repetitive compressions of bonding process while having highly-elastic silicone layer to guarantee maximum efficiency in the environment that is used repeatedly.

<table>
<thead>
<tr>
<th>SPEC.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>4 ~ 1400 mm</td>
</tr>
<tr>
<td>Length</td>
<td>5 ~ 50 M</td>
</tr>
<tr>
<td>Thickness</td>
<td>0.05 ~ 0.3 mm</td>
</tr>
</tbody>
</table>

The buffer sheet has thermal-resistant film, which minimizes the effect from the changes and loss of material because of the repetitive contacts of tools in high temperature and pressure conditions. PI is manufactured in a temperature that is 400° C or higher. It is also stable in current tool bonding conditions: 390°C~420°C, 10~20 sec. Thermal-resistant film has contraction response with heat so that the IC driver is not expanded because of the effect buffer material against the IC driver fine pitch.

**Quality test result with 1~60 repetitions**

**TAB and OLB main bonding pressure mark**

**Thermal temperature evaluation (within -2°C)**
Module Bonding Sheet - GLASS TYPE

**TAB, FOG, OLB, PCB Bonding**

- **Advantages of Glass Type**
  - Stability with natural mineral contents
  - High-strength and electrical insulation
  - Stable bonding with high thermal resistance
  - A little change of dimensions with repetitive bonding works
  - Excellent durability and thermal conductivity
  - Special multilayer material structure
  - Sheet curl control

**SPEC.**
- Width: 4 ~ 1400 mm
- Length: 5 ~ 50 M
- Thickness: 0.05 ~ 0.3 mm

**TECHNICAL DATA**

<table>
<thead>
<tr>
<th>Property</th>
<th>Typical Value</th>
<th>Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>Gray</td>
<td>Visual</td>
</tr>
<tr>
<td>Thickness</td>
<td>0.0mm to 0.25mm</td>
<td>ASTM D 374</td>
</tr>
<tr>
<td>Hardness (shore A)</td>
<td>50 ± 5</td>
<td>ASTM D 2240</td>
</tr>
<tr>
<td>Elongation</td>
<td>&lt;5%</td>
<td>ASTM D 412</td>
</tr>
<tr>
<td>Tensile Strength</td>
<td>&gt;50kg f/cm²</td>
<td>ASTM D 412</td>
</tr>
<tr>
<td>Density</td>
<td>1.9g/cm³</td>
<td>ASTM D 1505</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>1.5g/cc</td>
<td>ASTM D 790</td>
</tr>
<tr>
<td>Specific heat</td>
<td>1.03 J/g/k</td>
<td>ASTM D 351</td>
</tr>
<tr>
<td>Continuous Use Temp.</td>
<td>-60 to 200°C</td>
<td>***</td>
</tr>
</tbody>
</table>

**Electrical**
- Dielectric Breakdown Voltage: >5kV
  - Test Method: ASTM D 149
- Volume resistivity: –
  - Test Method: ASTM D 257
- Surface Resistivity: 10 11Ω
  - Test Method: ASTM D 257
- Dielectric Constant: –

**Thermal**
- Thermal Conductivity: 0.7W/m·K
  - Test Method: ASTM D 5470
- Thermal diffusivity: 1.1m²/s
  - Test Method: ASTM D 4612
- Flame Rating: –
  - Test Method: U.L
Module Bonding Sheet - SILICONE TYPE

SILICONE SHEET
This is a silicone rubber sheet to compress reusable compression sheet used for temporary and permanent compressions in an LCD bonding process, and it evenly maintains the pressure and temperature distribution between the heating tool and connections so that the substrate is damaged while having a stable connection.

- Flexibility and adhesion of thermal-conductive silicone rubber helps to maintain quick and even thermal distribution.
- It has higher thermal resistance than general silicone rubber and can endure over 300OC for a short time.
- It has good release.

SILICONE PAD
Reusable pad inserted into the tool tip for temporary compression during LCD bonding process.

- Outstanding thermal and electrical properties
- High thermal insulation with excellent elasticity and adhesion
- Easy attachment/detachment for a good release
- Awesome reusability with a good release among ACFs

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<tr>
<td>Property</td>
</tr>
<tr>
<td>Tensile Strength</td>
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<tr>
<td>Tear strength</td>
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<td>Elongation</td>
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<td>Hardness</td>
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<tr>
<td>Thermal Conductivity</td>
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IC Bonding