LOW PRESSURE MOLDING SOLUTIONS

SIMPLY THREE: INSERT. MOLD. TEST.
INTRODUCTION

LOW PRESSURE MOLDING

Henkel’s renowned TECHNOMELT low pressure molding solution is delivering exceptional sealing adhesion and excellent temperature and solvent resistance.

The simplicity of these materials is their advantage: Because the entire TECHNOMELT operation takes place at low pressure, cycle time is short and fine or fragile circuitry is not damaged, delivering measurable improvements over that of traditional potting or encapsulating processes.

PCB and circuitry protection is essential in modern, challenging applications, and Henkel delivers manufacturers proven, reliable solutions and peace of mind.
WHAT IS TECHNOMELT?

An innovative technology to serve the increasing demands for circuit board protection in the electronics market. Its low pressure and high speeds are suitable for sensitive electronic components in manufacturing environments. The technology allows for unique design beyond the form-fit-function of traditional encapsulating materials.

APPLICATIONS
- Automotive Sensors
- Switches
- Engine Control Units
- Lighting Display Boards
- Micro Inverters
- Power Regulators
- Industrial Sensors
- Medical Sensors

PROCESS

TRADITIONAL POTTING PROCESS FLOW

LOW PRESSURE PROCESS FLOW: THREE SIMPLE STEPS

INSERT ELECTRONICS  MOLD  TEST

30 sec.
LOW PRESSURE MOLDING
KEY BENEFITS

SIMPLIFIED MANUFACTURING PROCESS
• Reduced manufacturing steps
• Reduced equipment and operations footprint
• Fewer machines in a manufacturing line
• Fewer manufacturing lines needed to meet throughput
• Reduced cycle time per part
• Low-viscosity materials allow for low injection pressures

SUSTAINABILITY
• Zero waste
• All excess material and scrap are recyclable
• Natural ingredients
• No harmful fumes from molding process
• Long shelf life
• RoHS and REACH compliant

OPTIMIZED PRODUCTS
• Lightweight material
• Excellent adhesion to multiple surfaces
• Watertight encapsulation
• High temperature, shock, environmental and solvent resistance
• No cure process required
• No fillers, so mold sets can be made out of less expensive aluminum and still be durable
• Compliant materials suitable for sensitive electronic components

COST SAVINGS
• Fewer physical parts, reducing the number of items on the bill of materials (BOM)
• Reduced shipping costs of final products
• Reduced total cost of ownership (TCOO)
• Increased throughput
• Low capital equipment costs
• Reduced inventory and work in process (WIP)
• Lower labor cost per part

IMPROVED DESIGN FLEXIBILITY
• Precise design allows for more space and flexibility within the final assembled products
• Design capabilities beyond the form-fit-function of traditional materials
• Skylining allows for the use of less material, precise encapsulation and less weight
• Improved aesthetic appearance – no additional housing
### TECHNOMELT CIRCUIT BOARD PROTECTION PRODUCTS

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>DESCRIPTION</th>
<th>COLOR</th>
<th>PERFORMANCE TEMPERATURE</th>
<th>SHORE HARDNESS</th>
<th>SAFETY RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adhesion to Plastics</strong></td>
<td></td>
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</tr>
<tr>
<td>TECHNOMELT PA 633</td>
<td>High-performance thermoplastic polyamide with moderate strength and good adhesion for in-cabin and under-hood applications.</td>
<td>Amber</td>
<td>-40°C to 125°C</td>
<td>90A</td>
<td>UL 94 V-0</td>
</tr>
<tr>
<td>TECHNOMELT PA 638</td>
<td>Moldable polyamide, where excellent adhesion and cold-temperature flexibility are important, such as in an automotive exterior. Also used extensively in white goods.</td>
<td>Black</td>
<td>-40°C to 100°C</td>
<td>77A</td>
<td>UL 94 V-0</td>
</tr>
<tr>
<td>TECHNOMELT PA 652</td>
<td>Moldable polyamide with excellent adhesion to plastic substrates. It is designed for improved performance where prolonged exposure to moisture and harsh environments is expected.</td>
<td>Amber</td>
<td>-50°C to 100°C</td>
<td>77A</td>
<td>UL 94 V-0</td>
</tr>
<tr>
<td>TECHNOMELT PA 653</td>
<td>Moldable polyamide with excellent adhesion to tough substrates. Great flexibility offers incredible strain relief on cables and wires. Ideal for encapsulation of heat-producing components in appliances and consumer electronics.</td>
<td>Amber</td>
<td>-40°C to 100°C</td>
<td>83A</td>
<td>UL 94 V-0/UL RTI 95°C</td>
</tr>
<tr>
<td>TECHNOMELT TC 50</td>
<td>High-performance, filled thermoplastic polyamide formulated as a protective encapsulant for heat-generating devices requiring thermal management. This material allows encapsulation of fragile components without damage. Thermal conductivity is 0.65 W/mK.</td>
<td>Black</td>
<td>-40°C to 140°C</td>
<td>60D</td>
<td>UL 94 V-0</td>
</tr>
<tr>
<td><strong>High-Temperature Resistant</strong></td>
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</tr>
<tr>
<td>TECHNOMELT PA 673</td>
<td>Moldable polyamide with good adhesion for high-temperature applications, such as in an automotive under-hood.</td>
<td>Amber</td>
<td>-40°C to 140°C</td>
<td>88A</td>
<td>UL 94 V-0</td>
</tr>
<tr>
<td>TECHNOMELT PA 678</td>
<td>Moldable polyamide for the most demanding high-humidity applications, such as for automobile tire pressure sensors. Formulated for very low water vapor transmission.</td>
<td>Black</td>
<td>-40°C to 140°C</td>
<td>88A</td>
<td>N/A</td>
</tr>
<tr>
<td>TECHNOMELT PA 682</td>
<td>Designed for excellent heat resistance and good oil resistance. This material is also hard and has a very low moisture sensitivity.</td>
<td>Amber</td>
<td>-40°C to 175°C</td>
<td>57D</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Increased Hardness</strong></td>
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<tr>
<td>TECHNOMELT PA 341</td>
<td>High-performance thermoplastic polyamide designed to offer safety blaze orange color for easy identification of components. Typically used to encapsulate high-voltage modules.</td>
<td>Blaze Orange</td>
<td>-25°C to 125°C</td>
<td>92A</td>
<td>N/A</td>
</tr>
<tr>
<td>TECHNOMELT PA 641</td>
<td>Moldable polyamide, where strength and hardness are needed, such as in memory sticks and computer connectors.</td>
<td>Amber</td>
<td>-40°C to 125°C</td>
<td>92A</td>
<td>UL 94 V-0</td>
</tr>
<tr>
<td>TECHNOMELT PA 646</td>
<td></td>
<td>Black</td>
<td></td>
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</tr>
<tr>
<td><strong>Solvent Resistant</strong></td>
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<tr>
<td>TECHNOMELT PA 2384</td>
<td>Thermoplastic polyamide that exhibits good adhesion to filter papers, excellent heat resistance and excellent resistance against gasoline containing 20% alcohol, as well as many other solvents or chemicals.</td>
<td>Amber</td>
<td>10°C to 175°C</td>
<td>67D</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Specialty Technologies</strong></td>
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<tr>
<td>TECHNOMELT AS 4226</td>
<td>UV-stabilized thermoplastic material used in applications in which optical transparency is important to the functionality of the device. Allows for long-term exposure to UV light with minimal change to clarity or color. Ideal for applications such as in-cabin automotive sensors and industrial components.</td>
<td>Transparent</td>
<td>-40°C to 85°C</td>
<td>45D</td>
<td>UL 94 HB</td>
</tr>
<tr>
<td>TECHNOMELT AS 5375</td>
<td>Moldable polyolefin for demanding moisture and solvent resistance. Excellent adhesion to the most difficult substrates. Compatible with a secondary overmold with a harder polyamide.</td>
<td>Opaque White</td>
<td>-40°C to 100°C</td>
<td>45A</td>
<td>N/A</td>
</tr>
<tr>
<td>TECHNOMELT PA 668 CLEAR</td>
<td>Thermoplastic polyamide designed for overmolding sensitive electronic devices. The material is clear in color and is UV stabilized to retain a high level of clarity after exposure to UV and heat. This makes it ideal for LED and lighting applications.</td>
<td>Transparent</td>
<td>-25°C to 105°C</td>
<td>90A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>UV Resistant</strong></td>
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<tr>
<td>TECHNOMELT PA 649</td>
<td>UV-stabilized thermoplastic polyamide that is heat resistant, is flexible in low temperatures and is used in applications where thermal stability is paramount.</td>
<td>Black</td>
<td>-40°C to 130°C</td>
<td>88A</td>
<td>N/A</td>
</tr>
<tr>
<td>TECHNOMELT PA 668</td>
<td></td>
<td>White</td>
<td></td>
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<tr>
<td>TECHNOMELT PA 6344</td>
<td>High-performance, UV-resistant thermoplastic polyamide that exhibits good adhesion to a variety of substrates including solder mask.</td>
<td>Black</td>
<td>-40°C to 100°C</td>
<td>76A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### DISPENSABLE

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>DESCRIPTION</th>
<th>COLOR</th>
<th>SLUMP RESISTANCE</th>
<th>SHORE HARDNESS</th>
<th>VISCOSITY AT 163°C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Peelable Mask</strong></td>
<td></td>
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<tr>
<td>TECHNOMELT AS 8998</td>
<td>Peelable hot melt adhesive used to mask off areas that need protection before conformal coating is applied. Formulated to have excellent slump resistance.</td>
<td>Translucent Yellow</td>
<td>Up to 100°C</td>
<td>10A</td>
<td>2,900 to 4,000 cP</td>
</tr>
</tbody>
</table>

TECHNOMELT Circuit Board Protection Products
TECHNOMELT TC 50

TECHNOMELT TC 50, Henkel's thermally conductive TECHNOMELT material innovation, combines the low-pressure, protective benefits of all TECHNOMELT materials with thermally conductive functional capabilities.

As an alternative to conventional potting techniques, TECHNOMELT TC 50 offers improved process and performance benefits along with thermal conductivity >0.5 W/mK for the dissipation of heat through the encapsulating material.

BENEFITS
- Heat dissipation through TECHNOMELT low pressure molding material
- Substantially decreases component temperature
- Stable filler dispersion that eliminates settling for continued low pressure molding
- Low-abrasive filler

KEY APPLICATION AREAS

AUTOMOTIVE ELECTRONIC POWER SYSTEMS
- Excellent heat spreading to avoid hot spots
- Automotive fluid resistance
- Temperature-resistant materials for use in engine compartments
- Skylining allows for the use of less material, precise encapsulation and less weight – ideal for tight spaces in automotive applications

CAMERA MODULES
- Protects multiple components in one system
- Compatible with sensitive MEMS devices
- Flexible design options to fit into small spaces

POWER SUPPLIES
- Simplified process reduces filling and sealing steps
- High dielectric strength
- Eliminates housing, providing more streamlined design options

SOLAR INVERTERS
- Durable material to survive harsh outdoor environments
- Minimizes air gaps
- Completely seals connectors and wires from moisture ingress
- Minimizes interfacial resistance between the low pressure molding material and substrate, promoting heat transfer

LED DRIVERS
- Provides increased thermal transfer as power increases
- Dramatically improves cycle times over traditional potting materials
- UV, thermally and color stabilized
- UL rated
- Supports high-throughput manufacturing and improves scalability

technomelt-simply3.com
PEELABLE MASK

TECHNOMELT AS 8998

TECHNOMELT AS 8998 is an advanced and efficient approach to temporary masking techniques for conformal coating processes.

An alternative to manual taping methods, TECHNOMELT AS 8998 is a hot melt adhesive that can be precisely applied to keep-out areas via automated dispensing systems, reducing process time and labor costs.

The material is compatible with conformal coating chemistries, delivers better control during thermal cure and releases cleanly from various substrate surfaces.

PRODUCT BENEFITS

• Ultra-fast processing and solidification time
• Easily peelable
• Slump-resistant for improved dispense control
• Reduced labor and material cost
• Halogen-free and RoHS compliant
• No outgassing during coating process
• Can be dispensed automatically
• Compatible with Henkel conformal coatings

STANDARD MASKING AND CONFORMAL COATING PROCESS

CLEAN  MASK  CURE  COAT  CURE  DE-MASK

Replaced by
TECHNOMELT AS 8998
MARKETS
INDUSTRIAL COMPONENTS AND SENSORS

TECHNOMELT PA 646
• Provides good balance of low- and high-temperature performance
• Particularly suited for applications where high strength and hardness are desired
• Good adhesion to a variety of substrates
• Excellent moisture and environmental resistance

TECHNOMELT PA 6208 BLACK
• Consistent glossy, black color
• 95°C UL RTI rated
• Low viscosity
• High adhesion strength to challenging surfaces
• High dielectric strength
• Improved flexibility at low temperatures

TECHNOMELT PA 2384
• Chemical- and solvent-resistant material
• Polar solvent and hydrocarbon resistant
• High hardness
• High operating temperature
• Improved performance when exposed to industry-standard chemical media

TECHNOMELT PA 2384 offers chemical resistance for devices that are exposed to various chemicals, including solvents, acids, engine fluids, soaps and alkalines, among others.
TECHNOMELT PA 658
- Excellent humidity resistance
- Stable in long-term exposure to harsh automotive fluids
- Good adhesion to polypropylene and polyester

TECHNOMELT PA 678
- Ideal for high-temperature applications such as automotive under-hood
- Good adhesion to a variety of substrates
- Excellent moisture resistance and environmental resistance

TECHNOMELT PA 2692
- Increased thermal stability for the harshest environments
- Excellent resistance to automotive fluids
- Very low moisture sensitivity
- High hardness

MARKETS
AUTOMOTIVE ELECTRONICS

- Thermally stable materials, up to 185°C
- Chemically resistant materials to automotive fluids
- Low moisture absorption
- UL 94 V-0 flame resistance
- Blaze orange color options for easy safety identification
- Easy moldability
- Good adhesion to a variety of substrates
- Excellent environmental resistance
MARKETS
LIGHTING/LED

- Fast processing for high-volume LED manufacturing
- Flexible design options to complement the varied LED applications — from single LED applications to multi-strip, large display applications
- Optically transparent materials for maximum light transmittance
- Watertight, UV-stable materials to minimize impact from long-term outdoor exposure
- White material options to enhance reflection
- Compatible material sets for robust design solutions

TECHNOMELT PA 668
- White color maintained even when exposed to harsh external factors
- UV and thermally stabilized
- Superior molding and color integrity performance
- Ideal for indoor and outdoor LED lighting

TECHNOMELT PA 6344
- UV and thermal resistance
- Adheres well to a variety of substrates including plastic, glass and metals
- Good flexibility and mechanical strength
- Low durometer

TECHNOMELT AS 4226
- Ultra-clear, optically transparent
- UV and thermally stabilized
- One-component product / no mixing
- Good adhesion to PCBs and components
- Novel copolymer technology makes it ideal for sensitive electronic components