Technical Data Sheet

DOWSIL™ SE 4486 Thermally Conductive Adhesive

FEATURES & BENEFITS
- One part material
- Semi-flowable
- Fast tack-free time
- Good adhesion
- Thermally conductive

COMPOSITION
- Thermally conductive filler
- Polydimethylsiloxane adhesive

APPLICATIONS
DOWSIL™ SE 4486 Thermally Conductive Adhesive is designed to provide efficient thermal transfer for the cooling of modules, including home appliance devices.

TYPICAL PROPERTIES
Specification Writers: These values are not intended for use in preparing specifications.

<table>
<thead>
<tr>
<th>Property</th>
<th>Unit</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>One part or Two Part</td>
<td></td>
<td>One</td>
</tr>
<tr>
<td>Color</td>
<td></td>
<td>White</td>
</tr>
<tr>
<td>Viscosity</td>
<td>cP</td>
<td>19,600</td>
</tr>
<tr>
<td></td>
<td>Pa-sec</td>
<td>19.6</td>
</tr>
<tr>
<td></td>
<td>mPa-sec</td>
<td>19,600</td>
</tr>
<tr>
<td>Fluidity</td>
<td>mm</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>in</td>
<td>2.32</td>
</tr>
<tr>
<td>Specific Gravity (Cured)</td>
<td></td>
<td>2.6</td>
</tr>
<tr>
<td>Tack-Free Time at 25°C</td>
<td>minutes</td>
<td>4</td>
</tr>
<tr>
<td>Tensile Strength</td>
<td>psi</td>
<td>570</td>
</tr>
<tr>
<td></td>
<td>mPa</td>
<td>3.9</td>
</tr>
<tr>
<td></td>
<td>kg/cm²</td>
<td>40</td>
</tr>
<tr>
<td>Elongation</td>
<td>%</td>
<td>43</td>
</tr>
<tr>
<td>Durometer Shore A (JIS*)</td>
<td></td>
<td>81</td>
</tr>
<tr>
<td>Unprimed Adhesion - Lap Shear, Glass to Glass</td>
<td>psi</td>
<td>240</td>
</tr>
<tr>
<td></td>
<td>mPa</td>
<td>1.65</td>
</tr>
<tr>
<td></td>
<td>N/cm²</td>
<td>165</td>
</tr>
<tr>
<td>Thermal Conductivity</td>
<td>W/mK</td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td>btu/hr-ft-°F</td>
<td>0.92</td>
</tr>
</tbody>
</table>

These materials have properties such which can help to improve the transfer thin Bond Line Thicknesses (BLTs) thermal conductivity, and can achieve as low thermal resistance, high heat transfer media (i.e. heat sink). source (device) to the ambient via a "bridge" to remove heat from a heat conductive materials act as a thermal an integral role here. Thermally thermally conductive compounds play the life of the device. As such, operation and better reliability over device allows for more efficient concern of design engineers. A cooler PCB system assemblies is a primary combination these factors typically mean that more heat is generated in the area of consumer devices, there is also a continual trend towards smaller, more compact designs. In combination these factors typically mean that more heat is generated in the device. Thermal management of PCB system assemblies is a primary concern of design engineers. A cooler device allows for more efficient operation and better reliability over the life of the device. As such, thermally conductive compounds play an integral role here. Thermally conductive materials act as a thermal "bridge" to remove heat from a heat source (device) to the ambient via a heat transfer media (i.e. heat sink). These materials have properties such as low thermal resistance, high thermal conductivity, and can achieve thin Bond Line Thicknesses (BLTs) which can help to improve the transfer of heat away from the device.

SUBSTRATE TESTING
To ensure maximum bond strength for adhesives on a particular substrate, 100 percent cohesive failure of the adhesive in a lap shear or similar adhesive strength test is needed. This ensures compatibility of the adhesive with the substrate being considered. Also, this test can be used to determine minimum cure time or to detect the presence of surface contaminants such as mold release agents, oils, greases and oxide films.

DESCRIPTION
One-part RTV-cure thermally conductive materials cure with moisture exposure to produce durable, relatively low-stress elastomer with a noncorrosive by-product. PCB system assemblies are continually designed to deliver higher performance. Especially in the area of consumer devices, there is also a continual trend towards smaller, more compact designs. In combination these factors typically mean that more heat is generated in the device. The one-part moisture-cure adhesives are generally cured at room temperature and in a range of 0 to 80 percent relative humidity. Greater than 90 percent of their full physical properties should be attained within 4 to 7 hours depending on the product chosen. These materials are not typically used for highly confined or deep section cures. Materials will generally cure about 0.25 inch (6.35 mm) per 7 days.

ADHESION
Dow silicone adhesives are specially formulated to provide unprimed adhesion to many reactive metals, ceramics and glass, as well as to selected laminates, resins and plastics. However, good adhesion cannot be expected on non-reactive metal substrates or non-reactive plastic surfaces such as Teflon®, polyethylene or polypropylene. Special surface treatments such as chemical etching or plasma treatment can sometimes provide a reactive surface and promote adhesion to these types of substrates. Dow primers can be used to increase the chemical activity on difficult substrates. For best results, the primer should be applied in a very thin, uniform coating and then wiped off after application. After application, primers should be thoroughly air dried prior to application of the silicone elastomer. Alternatively, use a low-viscosity primerless adhesive to pot your components. Poor adhesion can be experienced on plastic or rubber substrates that are highly plasticized, since the mobile plasticizers act as release agents. Small-scale laboratory evaluation of all substrates is recommended before production trials are made. In general, increasing the cure temperature and/or cure time will improve the ultimate adhesion.

PROCESSING/CURING
The one-part moisture-cure adhesives should be operational over a temperature range of -45 to 200°C (-49 to 392°F) for long periods of time. However, at both the low and high temperature ends of the spectrum, behavior of the materials and performance in particular applications can become more complex and require additional considerations. For low-temperature performance, thermal cycling to conditions such as -55°C (-67°F) may be possible for most products, but performance should be verified for your parts or assemblies. Factors that may influence performance are configuration and stress sensitivity of components, cooling rates and hold times, and prior temperature history. At the high-temperature end, the durability of the cured silicones is time and temperature dependent. As expected, the higher the temperature, the shorter the time the material will remain useable.

USEFUL TEMPERATURE RANGES
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SOLVENT EXPOSURE
In general, the product is resistance to minimal or intermittent solvent exposure, however best practice is to avoid solvent exposure altogether.

USABLE LIFE AND STORAGE
The product should be stored in its original packaging with the cover tightly attached to avoid any contamination. Store in accordance with any special instructions listed on the product label. The product should be used by the indicated Exp. Date found on the label.

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HANDLING
PRECAUTIONS
PRODUCT SAFETY
INFORMATION REQUIRED FOR
SAFE USE IS NOT INCLUDED IN
THIS DOCUMENT. BEFORE
HANDLING, READ PRODUCT
AND SAFETY DATA SHEETS
AND CONTAINER LABELS FOR
SAFE USE, PHYSICAL AND
HEALTH HAZARD
INFORMATION. THE SAFETY
DATA SHEET IS AVAILABLE ON
THE DOW WEBSITE AT
WWW.CONSUMER.DOW.COM,
OR FROM YOUR DOW SALES
APPLICATION ENGINEER, OR
DISTRIBUTOR, OR BY CALLING
DOW CUSTOMER SERVICE.

LIMITATIONS
This product is neither tested nor
represented as suitable for medical or
pharmaceutical uses.

HEALTH AND
ENVIRONMENTAL
INFORMATION
To support customers in their product
safety needs, Dow has an extensive
Product Stewardship organization and
a team of product safety and
regulatory compliance specialists
available in each area.

For further information, please see our
website, www.consumer.dow.com or
consult your local Dow representative.

LIMITED WARRANTY
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The information contained herein is
offered in good faith and is believed to
be accurate. However, because
conditions and methods of use of our
products are beyond our control, this
information should not be used in
substitution for customer’s tests to
ensure that our products are safe,
effective, and fully satisfactory for the
intended end use.

Suggestions of use shall not be taken
as inducements to infringe any patent.

Dow’s sole warranty is that our
products will meet the sales
specifications in effect at the time of
shipment.

Your exclusive remedy for breach of
such warranty is limited to refund of
purchase price or replacement of any
product shown to be other than as
warranted.

TO THE FULLEST EXTENT
PERMITTED BY APPLICABLE
LAW, DOW SPECIFICALLY
DISCLAIMS ANY OTHER
EXPRESS OR IMPLIED
WARRANTY OF FITNESS FOR A
PARTICULAR PURPOSE OR
MERCHANTABILITY.

DOW DISCLAIMS LIABILITY
FOR ANY INCIDENTAL OR
CONSEQUENTIAL DAMAGES.

HOW CAN WE HELP YOU
TODAY?
Tell us about your performance,
design, and manufacturing challenges.
Let us put our silicon-based materials
expertise, application knowledge, and
processing experience to work for
you.

For more information about our
materials and capabilities, visit

To discuss how we could work
together to meet your specific needs,
go to www.consumer.dow.com for a
contact close to your location. Dow
has customer service teams, science
and technology centers, application
support teams, sales offices, and
manufacturing sites around the globe.

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