



Output™ 384

December 2003

PRODUCT DESCRIPTION

LOCTITE® Output™ 384 provides the following product characteristics:

Technology	Acrylic
Chemical Type	Modified acrylic
Appearance (uncured)	White paste ^{LMS}
Components	One component - requires no mixing
Cure	Activator
Application	Bonding
Operating Temperature	-54°C to +150°C

Output™ 384 applications include bonding transformers, transistors and other heat generating electronic components to printed circuit board assemblies or heat sinks.

TYPICAL PROPERTIES OF UNCURED MATERIAL

Specific Gravity @ 25°C	1.64
Flash Point (TCC), °C	>93
Viscosity @ 25°C, mPa·s:	
Brookfield HBT:	
Spindle TE @ 2.5 rpm, Helipath adhesive	500,000 to 2,250,000 ^{LMS}
Spindle TE @ 20 rpm, Helipath adhesive	300,000 to 800,000 ^{LMS}

TYPICAL PROPERTIES OF CURED MATERIAL

Physical Properties:

Coefficient of Thermal Expansion, ppm/°C	69.00
Coefficient of Thermal Conductivity, W/mK	0.757
Tensile Strength, at break, ASTM D 882, N/mm²	12.70
Elongation, at break, ASTM D 882, %	0.90
Modulus, ASTM D 882, N/mm²	2,760

Electrical Properties:

Dielectric Constant / Loss, ASTM D 150:	
100 Hz	6.48 / 0.10
1kHz	5.86 / 0.04
1mHz	5.22 / 0.03
Volume Resistivity, ASTM D 257, Ω	13×10 ¹¹
Surface Resistivity, ASTM D 257, Ω	51×10 ¹²
Dielectric Strength, ASTM D 149, kV/mm	680

PERFORMANCE OF CURED MATERIAL

After 24 hr at 22°C, Act. 7387 on 1 side.

Adhesive Properties:

Shear Strength, ASTM D 1002, N/mm² :	
Steel to steel:	
0 gap	≥5.20
Tensile Shear, N/mm² :	
Steel	≥5.20 ^{LMS}

TYPICAL ENVIRONMENTAL RESISTANCE

After 24 hr at 22°C, Act. 7387 on 1 side.

Adhesive Properties:

Shear Strength, ASTM D 1002, N/mm² :	
Steel to steel	

Chemical/Solvent Resistance

Aged under conditions indicated and tested at 22°C.

		% of initial strength
Environment	°C	720 hr
Air	87	140
Water	87	76
Freon TF	87	85

Thermal Cycle Resistance

Bonded aluminum to epoxyglass lapshears cured 72 hours using Output Activator on one side were subjected to thermal cycling of 15°C to 100°C with a ramp time of 30 minutes. No loss in strength occurred after 1000 hours of cycle time.

GENERAL INFORMATION

This product is not recommended for use in pure oxygen and/or oxygen rich systems and should not be selected as a sealant for chlorine or other strong oxidizing materials.

For safe handling information on this product, consult the Material Safety Data Sheet (MSDS).

Where aqueous washing systems are used to clean the surfaces before bonding, it is important to check for compatibility of the washing solution with the adhesive. In some cases these aqueous washes can affect the cure and performance of the adhesive.

This product is not normally recommended for the use on plastics (particularly thermoplastic materials where stress cracking of the plastic could result). Users are recommended to confirm compatibility of the product with such substrates.

Directions for use

1. For best performance bond surfaces should be clean and free from grease.
2. Use applicator to apply the activator to the surface to be bonded.
3. After the solvent evaporates, the active ingredients will appear wet, and will remain active for up to two hours after application. Contamination of the surface before bonding should be prevented.
4. Apply adhesive to the unactivated surface.
5. Secure the assembly, and wait for the adhesive to fixture (approximately 5 minutes) before any further handling. Full cure occurs in 4 - 24 hours.
6. The amount of adhesive applied to the part or heat sink should be limited to the amount necessary to fill the bond and just enough to give a small fillet.
7. The dispensing or application of the adhesive should be done as to minimize air entrapment within the bondline.
8. The successful application of this product depends on accurate dispensing on the parts to be bonded. Loctite Equipment Engineers are available to assist you in selecting and implementing the appropriate dispensing equipment for your application.

Device Removal/Repair

Components or devices with this thermally conductive adhesive can be removed while hot using heat from a hot air jet. Bond strength decreases at approximately 65°C to 93°C allowing components to be removed with lower shear forces. Method of removal should be specifically determined due to the variety of components or devices bonding behavior.

Loctite Material Specification^{LMS}

LMS dated AUG 6, 1998. Test reports for each batch are available for the indicated properties. LMS test reports include selected QC test parameters considered appropriate to specifications for customer use. Additionally, comprehensive controls are in place to assure product quality and consistency. Special customer specification requirements may be coordinated through Henkel Loctite Quality.

Storage

Store product in the unopened container in a dry location. Storage information may be indicated on the product container labeling.

Products shall be maintained at temperatures between 2°C to 8°C unless otherwise labeled, or, specified. Storage, at temperatures below 2°C, or, greater than 8°C, is not recommended. Temperatures below 2°C and above 8°C can adversely affect product properties.

Material removed from containers may be contaminated during use. Do not return product to the original container. Loctite cannot assume responsibility for product which has been contaminated or stored under conditions other than those previously indicated. If additional information is required, please contact your local Technical Service Center or Customer Service Representative.

Conversions

$(^{\circ}\text{C} \times 1.8) + 32 = ^{\circ}\text{F}$

$\text{kV/mm} \times 25.4 = \text{V/mil}$

$\text{mm} \times 0.039 = \text{inches}$

$\text{mPas} = \text{cP}$

$\text{N/mm}^2 \times 145 = \text{psi}$

$\text{N} \times 0.225 = \text{lbs}$

Note

The data contained herein are furnished for information only and are believed to be reliable. We cannot assume responsibility for the results obtained by others over whose methods we have no control. It is the user's responsibility to determine suitability for the user's purpose of any production methods mentioned herein and to adopt such precautions as may be advisable for the protection of property and of persons against any hazards that may be involved in the handling and use thereof. In light of the foregoing, **Henkel Loctite Corporation specifically disclaims all warranties expressed or implied, including warranties of merchantability or fitness for a particular purpose, arising from sale or use of Henkel Loctite Corporation's products. Henkel Loctite Corporation specifically disclaims any liability for consequential or incidental damages of any kind, including lost profits.** The discussion herein of various processes or compositions is not to be interpreted as representation that they are free from domination of patents owned by others or as a license under any Henkel Loctite Corporation patents that may cover such processes or compositions. We recommend that each prospective user test his proposed application before repetitive use, using this data as a guide. This product may be covered by one or more United States or foreign patents or patent applications.

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Reference 0.1