LOCTITE® 5110™

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PRODUCT DESCRIPTION

LOCTITE® 5110™ provides the following product characteristics:

Technology	Acrylic
Chemical Type	Methacrylate monomers
Appearance (uncured)	Transparent liquid[LMS]
Fluorescence	Positive under UV light[LMS]
Emulsification	Disperses in water - does not seperate as oily layer[LMS]
Components	One component - requires no mixing
Viscosity	Low
Cure	Anaerobic
Application	Sealing

LOCTITE® 5110™ is a low viscosity liquid sealant designed for sealing interfacial leak paths in rigid electronic assemblies. It may also be used to enhance dielectric strength or seal porosity in passive materials. LOCTITE® 5110™ sealant is typically applied with a vacuum impregnation process that removes air from the internal void and then saturates the part with liquid sealant. Excess liquid sealant is rinsed from the outside of the part with an aqueous solution effectively leaving no surface build up. In the absence of circulating air, the liquid rapidly polymerizes to form a tough thermoset polymer that permanently seals gaps in the assembly. Parts processed with LOCTITE® 5110™ are sealed internally but remain cosmetically and dimensionally unchanged. Typical applications include sealing or unitizing overmolded electrical components against leakage of air, water, coolants, oils and other fluids. Connectors, high temperature coils, and lamination stacks in brushless motors, solenoids, and sealed enclosures have been sealed successfully. As a good insulator, LOCTITE® 5110™ may also be used to improve the dielectric strength across gaps between high voltage conductors.

TYPICAL PROPERTIES OF UNCURED MATERIAL

Specific Gravity @ 25 °C	1.09
Surface Tension, ASTM D 1590, dynes/cm	42.3
Flash Point - See MSDS	
Viscosity, Brookfield - RVT, 25 °C, mPa·s (cP):	
Spindle 2, speed 50 rpm	36 to 66[LMS]

TYPICAL PROPERTIES OF CURED MATERIAL

Physical Properties

Coefficient of Thermal Expansion, K^{-1}	7.94×10^{-5}
Density @ 25 °C, g/cm³	1.21
Shore Hardness, ISO 868, Durometer D	89
Design Limit, Continuous Temperature, °C	205
Design Limit, Temperature Exposure less than 24 hours, °C	232
Compressive Modulus, ISO 604	N/mm² (psi) 1,790 (260,000)
Flexural Modulus , ASTM D790	N/mm² (psi) 1,740 (250,000)

Electrical Properties

Volume Resistivity, IEC 60093, Ω·cm	9×10^{13}
Dielectric Breakdown Strength, IEC 60243-1, kV/mm	39.4
Dielectric Constant , IEC 60250:	
100Hz	4.0
1 kHz	4.0
1 MHz	3.8

TYPICAL ENVIRONMENTAL RESISTANCE

Data shown herein should not be used in place of actual part testing. Sealing performance depends as much upon the surrounding substrate as it does upon the sealant. The parent material provides substantial protection against oxygen and pressure loads. Smaller pores, longer leak paths and lower differential pressures yield better durability. The testing described herein provides standard comparisons of LOCTITE® sealants on a consistent interface. *Predicting the performance of real world applications using extrapolations from this data is not recommended*. The performance of any sealant should be experimentally validated against the specific demands of a particular application, preferably using actual production methods.

Durability Performance

Standard test pieces were sealed with LOCTITE® 5110™ and subjected to accelerated life testing under adverse conditions. The test specimen was 3.2 mm thick FC0208 sintered powder metal of 6.8 g/mL density (12% porous substrate). Samples were tested at 4 atmospheres internal pressure. Leak rates were measured using volume/time at pressure under water. Initial leak rates were over 10,000 mL/minute.

		% of initial leak			
Environment	**°C**	**500 h**	**1000 h**	**2000 h**	**4100 h**
21% Oxygenated Air (control)	23	0	0	0	0
Unleaded gasoline	23	0	0	0	0
Motor oil (10W-30)	121	0	0	0	0
ATF (Dexron III)	121	0	0	0	0
Water/glycol 50/50	121	0	0	0	0
Brake Fluid (Dot 3)	121	0	0	0	0
21% Oxygenated Air	121	*0.0	*0.0	*0.0	*0.0

* 0.0% signifies a leak that is too small to quantify (<0.01%)

High Temperature Resistance
At temperatures above 160 °C, organic polymers may react with available oxygen. In porosity, the surrounding substrate typically protects the sealant from air. Oxidation may cause the sealant to discolor without compromising the seal. Exterior surfaces are affected first; therefore, cross-sections that are thicker than 3.2 mm enjoy proportionately higher resistance. Applications that include working fluids other than oxygenated air resist elevated temperatures better.

Conditioning	Environment	% Leak
4100 hours salt fog	40 °C, Condensing	0
1000 Thermal Cycles	-40 °C to + 121 °C, 2 hour period	0.1
Acid Exposure	24 hours in pH 1 sulfuric acid	0
Caustic Exposure	24 hours in pH 13 sodium hydroxide	0
Hot Strength	100 psi air, part @ 176 °C	0

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).

Directions for use
Porosity sealants typically require catalyzation and must be handled with chemically compatible materials and equipment.

Use of process equipment designed, built and maintained to LOCTITE® standards is recommended to ensure consistent performance. Consult a LOCTITE® Porosity Sealing Specialist for specific application assistance,process development and equipment selection.

1. Typically, a basket of parts is submerged in sealant. Air is expelled out of the porosity under vacuum.
2. A pressure increase causes the sealant to flow into the pore. Ambient pressure is typical but may be augmented.
3. The basket is lifted and spins to reclaim excess sealant.
4. The parts basket is washed in water with agitation as necessary to achieve good cleaning.
5. Parts cure and dry at room temperature.

Anaerobic Cure Mechanism
Liquid LOCTITE® 5110™ cures in the absence of freely available oxygen. Surface bleedout normally associated with hot water cure is eliminated.

Cure rate depends on the part temperature, dimension and chemical activity of the surrounding porosity. In general, parts can be pressure tested within 5 to 30 minutes after processing.

Waste Rinse Water Disposal
Waste rinse water generated during the porosity sealing process can, in general, be adequately handled by conventional biological treatment methods. Since both the circumstances of use and local environmental requirements vary, waste disposal recommendations are location specific. Depending on the particular parameters, a LOCTITE® Porosity Sealing Specialist can characterize effective waste disposal options for a wide range of solutions from passive handling to zero discharge.

Loctite Material Specification[LMS]
LMS dated June 30, 2005. 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 Quality.

Storage
Store product in the unopened container in a dry location. Storage information may be indicated on the product container labeling.
Optimal Storage: 8 °C to 21 °C. Storage below 8 °C or greater than 28 °C can adversely affect product properties. Material removed from containers may be contaminated during use. Do not return product to the original container. Henkel Corporation 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
(°C x 1.8) + 32 = °F
kV/mm x 25.4 = V/mil
mm / 25.4 = inches
µm / 25.4 = mil
N x 0.225 = lb
N/mm x 5.71 = lb/in
N/mm² x 145 = psi
MPa x 145 = psi
N·m x 8.851 = lb·in
N·m x 0.738 = lb·ft
N·mm x 0.142 = oz·in
mPa·s = cP

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 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 Corporation's products. Henkel 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 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 1.0