

# LOCTITE STYCAST ES 4212

September 2012

## PRODUCT DESCRIPTION

LOCTITE STYCAST ES 4212 provides the following product characteristics:

|                                                         |                                 |
|---------------------------------------------------------|---------------------------------|
| <b>Technology</b>                                       | Epoxy                           |
| <b>Appearance, Resin (Component A)</b>                  | Black                           |
| <b>Appearance, Hardener (Component B)</b>               | Tan                             |
| <b>Appearance (cured)</b>                               | Black                           |
| <b>Components</b>                                       | Two component - requires mixing |
| <b>Mix Ratio, by volume - Part A: Part B</b>            | 100 : 100                       |
| <b>Mixing Ratio, by weight Component A: Component B</b> | 100 : 90                        |
| <b>Cure</b>                                             | Room temperature cure           |
| <b>Application</b>                                      | Potting and Encapsulating       |

LOCTITE STYCAST ES 4212 is a two-component, long pot life, casting system with excellent handling properties. This low cost, flexible system is filled with a non-abrasive filler for machine metering/dispensing. This material has good thermal shock resistance and low exotherm, making it suitable for encapsulation of various components and modules.

## UL Classification

**Classified by Underwriters Laboratories Inc.®** UL-94 "Test for Flammability of Plastic Materials" and meets the requirements of 94HB in a 3.3 mm cross section.

## TYPICAL PROPERTIES OF UNCURED MATERIAL

### Part A Properties

|                                                                            |        |
|----------------------------------------------------------------------------|--------|
| Density, @ 25 °C, g/cm <sup>3</sup>                                        | 1.6    |
| Filler Content, %                                                          | 50     |
| Viscosity, Brookfield - RVF, 25 °C, mPa·s (cP):<br>Spindle 7, speed 20 rpm | 45,000 |

### Part B Properties

|                                                                            |       |
|----------------------------------------------------------------------------|-------|
| Density, @ 25 °C, g/cm <sup>3</sup>                                        | 1.45  |
| Filler Content, %                                                          | 50    |
| Viscosity, Brookfield - RVF, 25 °C, mPa·s (cP):<br>Spindle 6, speed 20 rpm | 9,000 |

### Mixed Properties

|                                                                           |        |
|---------------------------------------------------------------------------|--------|
| Viscosity, Brookfield - RVF, 25 °C, mPa·s (cP):<br>Spindle 5, speed 2 rpm | 25,000 |
| Density, @ 25 °C, g/cm <sup>3</sup>                                       | 1.57   |
| Filler Content, %                                                         | 51     |
| Peak Exotherm Temperature, °C:<br>200 g mass                              | 36     |
| Pot Life @ 25 °C, minutes:<br>200 g mass                                  | 230    |
| 500 g mass                                                                | 180    |
| 1,000 g mass                                                              | 135    |

## TYPICAL CURING PERFORMANCE

### Recommended Curing Conditions

36 to 48 hours @ 25 °C (Recommended cure)  
3 hours @ 60 °C (Alternate cure)

The above cure profiles are guideline recommendations. Cure conditions (time and temperature) may vary based on customers' experience and their application requirements, as well as customer curing equipment, oven loading and actual oven temperatures.

## TYPICAL PROPERTIES OF CURED MATERIAL

### Physical Properties

|                                                                                    |                                          |
|------------------------------------------------------------------------------------|------------------------------------------|
| Glass Transition Temperature, ISO 11357-2, °C                                      | 20                                       |
| Coefficient of Thermal Expansion ASTM D7012, K <sup>-1</sup> :<br>Pre Tg (Alpha 1) | 95×10 <sup>-6</sup>                      |
| Post Tg (Alpha 2)                                                                  | 235×10 <sup>-6</sup>                     |
| Coefficient of Thermal Conductivity, ISO 8302, W/(m·K)                             | 0.42                                     |
| Linear Shrinkage, ASTM D792, %                                                     | 0.53                                     |
| Shore Hardness, ISO 868, Durometer D                                               | 75                                       |
| Water Absorption, ISO 62, %:<br>24 hours in water @ 25 °C                          | 0.76                                     |
| Izod Impact Strength, N/mm of notch                                                | 0.05                                     |
| Elongation, ISO 527-2, %                                                           | 14                                       |
| Tensile Strength, ISO 527-2                                                        | N/mm <sup>2</sup> 15.5<br>(psi) (2,250)  |
| Compressive Strength, ISO 604                                                      | N/mm <sup>2</sup> 72.4<br>(psi) (10,500) |

### Electrical Properties

|                                                                  |                    |
|------------------------------------------------------------------|--------------------|
| Dielectric Breakdown Strength IEC 60243-1, kV/mm                 | 50                 |
| Volume Resistivity, IEC 60093, Ω·cm:<br>@ 25 °C                  | 2×10 <sup>13</sup> |
| @ 105 °C                                                         | 4×10 <sup>9</sup>  |
| Surface Resistivity, IEC 60093, Ω:<br>@ 25 °C                    | 1×10 <sup>14</sup> |
| @ 105 °C                                                         | 2×10 <sup>11</sup> |
| Dielectric Constant / Dissipation Factor, IEC 60250:<br>@ 25 °C: |                    |
| 100 Hz                                                           | 5.7 / 0.84         |
| 1 kHz                                                            | 5.2 / 0.062        |
| 100 kHz                                                          | 4.4 / 0.009        |
| @ 105 °C:                                                        |                    |
| 100 Hz                                                           | 20.0 / 8.862       |
| 1 kHz                                                            | 2.0 / 0.048        |
| 100 kHz                                                          | 8.6 / 0.104        |

## GENERAL INFORMATION

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

**Directions for use**

1. The standard mix ratio of LOCTITE STYCAST ES 4212 is 100 parts A to 100 parts B by volume. By decreasing the amount of hardener to 90 parts Part B by volume, maximum rigidity and hardness will be obtained. By increasing the amount of hardener to 110 parts Part B by volume, flexibility will be increased. Other property variations may also be observed. No mix ratio beyond these two extremes should be used.
2. LOCTITE STYCAST ES 4212 will settle upon storage, especially at temperatures exceeding 27 °C. Refrigerated storage will minimize filler settling. Each container must be thoroughly mixed before combining Part A and Part B. For ease of mixing, store containers upside down. After warming to room temperature, approximately 10 minutes on a standard paint shaker will normally ensure complete dispersion of the filler.

**Not for product specifications**

The technical data contained herein are intended as reference only. Please contact your local quality department for assistance and recommendations on specifications for this product.

**Storage**

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

**Liquid Storage - Liquids should be stored at 25°C or below, in closed containers. If stored below 25°C, the material MUST be allowed to come to room temperature, in the sealed container, to avoid moisture contamination.**

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**

$(^{\circ}\text{C} \times 1.8) + 32 = ^{\circ}\text{F}$   
 $\text{kV/mm} \times 25.4 = \text{V/mil}$   
 $\text{mm} / 25.4 = \text{inches}$   
 $\text{N} \times 0.225 = \text{lb}$   
 $\text{N/mm} \times 5.71 = \text{lb/in}$   
 $\text{psi} \times 145 = \text{N/mm}^2$   
 $\text{MPa} = \text{N/mm}^2$   
 $\text{N} \cdot \text{m} \times 8.851 = \text{lb} \cdot \text{in}$   
 $\text{N} \cdot \text{m} \times 0.738 = \text{lb} \cdot \text{ft}$   
 $\text{N} \cdot \text{mm} \times 0.142 = \text{oz} \cdot \text{in}$   
 $\text{mPa} \cdot \text{s} = \text{cP}$

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Reference 1