Product Description

FP4651 provides the following product characteristics:

<table>
<thead>
<tr>
<th>Technology</th>
<th>Epoxy</th>
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<tbody>
<tr>
<td>Appearance</td>
<td>Black</td>
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</table>
| Product Benefits | • High purity  
• Self-leveling  
• Excellent chemical resistance  
• High thermal stability  
• Low thermal expansion  
• Low viscosity |
| Components | One-component |
| Filler content | 82% |
| Cure | Heat cure |
| Application | Encapsulant |
| Typical Applications | Cavity-fill and fine wire pitch applications |

FP4651 epoxy encapsulant features very low thermal expansion while retaining syringe dispense capabilities. Its low viscosity and 50 micron maximum particle size give it improved handling properties over FP4650 for fine wire pitch and cavity-fill applications. It is based on FP4450 resin chemistry, therefore exhibiting excellent chemical resistance and thermal stability properties.

Typical Properties of Uncured Material

- **Viscosity, Brookfield - RVF, 25 °C, mPa·s (cP):** 130,000
- **Specific Gravity:** 1.91
- **Pot life @ 25 °C, days:** (Time required to double viscosity) 2
- **Gel Time @ 121 °C, minutes:** 9
- **Shelf Life @ -40°C, months:** 9
- **Flash Point:** See MSDS

Typical Curing Performance

- **Recommended Cure Schedule:**
  - 1 hour @ 125°C plus
  - 90 minutes @ 165°C

- **Alternative Cure Schedule:**
  - 2 hours @ 110°C plus
  - 3 hours @ 165°C

The above cure profile is a guideline recommendation. 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:**
  - **Coefficient of Thermal Expansion ppm/°C:**
    - Below Tg (40 to 120°C) 11
    - Above Tg (190 to 220°C) 50
  - **Glass Transition Temperature (Tg), °C:** 150
  - **Extractable Ionic Content, ppm:**
    - Chloride (Cl⁻) 5
    - Potassium (K+) 1
    - Sodium (Na+) 1

General Information

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

Thawing:

1. Frozen packages must be completely thawed before use.
2. Warm at room temperature until no longer cool to the touch (normally 20 to 60 minutes).
3. **DO NOT** thaw in an oven.

Directions for Use

1. FP4651 should be dispensed onto a substrate warmed to approximately 80°C. This will help minimize air entrapment.
2. Warm FP4651 to 30 to 40°C for faster dispensing.
3. **NOTE:** Elevated temperatures reduce working life.

Storage

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

Optimal Storage: ≤40 °C

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

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 and its affiliates ("Henkel") specifically disclaims all warranties expressed or implied, including warranties of merchantability or fitness for a particular purpose, arising from sale or use of Henkel products. Henkel 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 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