ELANTAS
Electrical Insulation

**Product Information**

Electronic Protection System

**Thick Film Coating, thermal cure**

# Bectron® PK 4351

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## Product description

Bectron® PK 4351 is a one-component resin system which cures to form a fairly soft polyurethane duroplastic. It comprises a liquid polyol system with a dispersed solid encapsulated polyisocyanate and a pigment combination selected to provide controlled rheology including excellent thixotropic properties.

Heating the resin releases the encapsulated polyisocyanate resulting in a polyaddition reaction to give a resistant duroplastic cured material.

In contrast to the usual 2 component resin systems Bectron® PK 4351 is ready to use and distinguished by excellent properties and especially good environmental compatibility.

## Areas of application

The cured Bectron® PK 4351 is a semi-flexible duroplastic suitable for chemical and shock protection of components.

It is therefore most suited for the partial or selective coating of SMD and other components groups on printed circuit boards and ceramic substrates. It is also used as a casting/potting resin for electronic components and sensors, automotive electronics, plugs such as

- hybrid coating
- glass diode coating
- partial coating of circuit board components
- ceramic substrate

## Properties of the cured material

The cured material displays elasticity and strength resulting in very good temperature cycling behaviour within the range of -60°C to +125°C as well as resistance to moisture.

Bectron® PK 4351 also displays very good adhesion to most materials used in the electronic field.
Even after several temperature cycles there is no loss of adhesion, and mechanical and electrical properties are maintained.

Satisfies ROHS Directive

## Storage

Containers filled with Bectron® PK 4351 should be stored at a temperature ≤ 25°C and kept closed to protect the resin against humidity.

During longer storage periods of the containers, some settling of the pigments can occur and it is advisable to homogenise the resin by rotation of the containers prior to filling storage or service tanks.

## Processing suggestions

Prior to processing the resin compound in a storage tank should again be stirred well, e.g. 10 minutes at 20 rpm. Vacuum is not needed, but a nitrogen atmosphere is advisable to protect from humidity.

Application can be by dipping or via suitable dispensing equipment.

Hybrid coating is preferably done by dipping. A uniform, even, coating of pins with no dripping or edges can be achieved with only one application. The cycle times for immersing, and retraction depend on the object to be processed.

For partial coating the use of dispensing equipment is recommended. During dispensing, the shear applied to the resin, governed by the diameter, length and applied pressure on the dispensing needle, reduces the viscosity allowing fast processing and blister-free casting. On contact with the object the viscosity increases rapidly and enables precise coating of the designated areas. The resulting coating maintains its form and size even during subsequent curing.

The following curing conditions are recommended:

- 60 minutes at 80°C or
- 30 minutes at 90°C

For volume production the application of infrared (IR) radiation leads to a considerable reduction of curing times, e.g. values of <10 minutes are attainable.

To ensure satisfactory adhesion on the PCB surface the following should be checked:

- Use of residue-free flux
- ensure dry surfaces
- Check compatibility of the coating resin with the solder resist and solder paste.

### Table 1 - Properties of component as supplied

| **Property** | Condition | Value | Unit |
|---|---|---|---|
| Viscosity, DIN 53019 | D=15 $s^{-1}$, 23°C | 6.250 ± 1.250 | mPas |
| Density, DIN 51757 | 23°C | 1,38 ± 0,01 | g/cm³ |
| Shelf life | 23°C | 7 | months |

### Table 2 - Gel-time, curing conditions

| **Property** | Value | Value | Unit |
|---|---|---|---|
| Temperature | 80 | 90 | °C |
| Gel-time | 5 ± 2 | | min |
| Curing | 65 ± 5 | 30 ± 5 | min |

### Table 3 - Thermal properties of cured compound

| **Property** | Condition | Value | Unit |
|---|---|---|---|
| Coefficient of thermal expansion, Beck Test M 56 | -20°C to + 90°C | 180 x$10^{-6}$ | $K^{-1}$ |
| Thermal conductivity, DIN 52616 | 23°C | 0,18 ± 0,02 | W/mK |

### Table 4 - Mechanical properties of cured compound

| **Property** | Condition | Value | Unit |
|---|---|---|---|
| Glass transition temperature, IEC 61006 | - | -50 | °C |
| Shore hardness, ISO 868 | 23°C | 30 ± 10 | Shore D |
| Compressive strength, ISO 604, DIN 57291 | 30%, 23°C | 19 | N/mm² |
| Residual deformation | 23°C | 1.9 | % |

### Table 5 - Dielectric properties of cured compound

| **Property** | Condition | Value | Unit |
|---|---|---|---|
| Volume resistivity, IEC 60455 Part 2<br>After water immersion | Initial value<br>7d | $10^{13}$<br>$10^{11}$ | Ω • cm<br>Ω • cm |
| Dielectric strength, IEC 60455 Part 2 | 23°C<br>80°C | 17<br>20 | kV/mm<br>kV/mm |
| Tracking, IEC 60112 | Solution B | CTI>600 M | |
| Dielectric dissipation tanδ, IEC 60250 | 10 kHz, 1V 23°C | 0.036 | - |
| Relative permittivity tanδ, IEC 60250 | 10 kHz, 1V 23°C | 5.3 | - |

### Table 6 - Chemical properties of cured compound

| **Property** | Condition | Value | Unit |
|---|---|---|---|
| Water absorption, ISO 62, Method 1 | 24h / 23°C | 116 | mg |

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