APPLICATION**NOTE**

A New Sample Holder for Low-Viscosity Liquids Part 2 – Test Results on an Epoxy Resin During Curing

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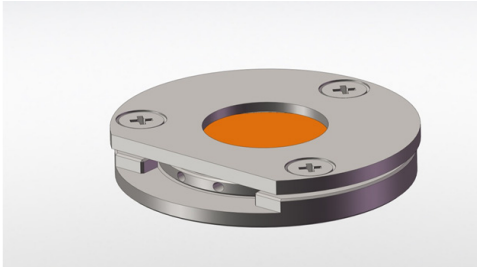
In this work, the tests were carried out during curing at 60°C, 80°C and 100°C. At each temperature, a series of tests was performed for a period of approximately 110 minutes (representing the typical production times). This special temperature program was selected to follow the typical curing process range in a production plant. The tests were carried out by preheating the sample holder stage of the instrument to the selected temperature. Then, the sample was inserted and the tests were started immediately. To measure a sample which is liquid at the beginning of the tests, a special sample holder is required, keeping the sample in the required position and shape inside the flash system. This sample holder is depicted in figure 1.



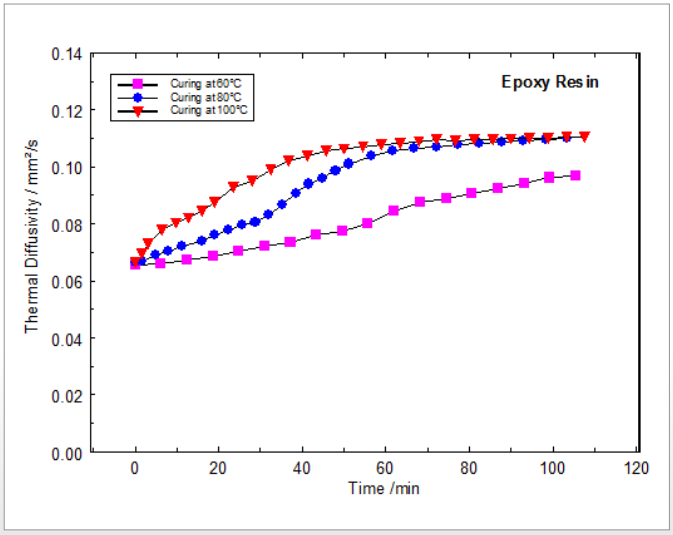
1 Sample holder for low-viscosity liquids

It consists of two metal orifices, separated by a PEEK ring with a well-defined thickness. Between the orifices and a distance ring, a thin sheet metal plate is brought in. The entire setup generates a tight volume inside the sample holder with well-defined dimensions.

The PEEK ring has two holes for filling in the liquid material. The second hole allows the gas leaving the system during the filling process. Therefore, a highly viscous liquid can be filled in without the risk of generating bubbles inside the holder. The two holes are closed, after the sample holder is completely filled. The entire setup was then placed inside the flash system to carry out the tests. After the tests, the system can be disassembled and the cured resin disk can be taken out for final inspection or for further analysis.

Measurement Results

Figure 2 presents the values of the thermal diffusivity of the resin versus time at curing temperatures of 60°C, 80°C and 100°C. As can be seen in this figure, the thermal diffusivity increases with time in all cases. The results at 60°C show a nearly constant increase versus time. At 80°C, the thermal diffusivity increases faster and linearly for the first 30 minutes. Then, a step is visible in the curve. After 80 minutes, the results reach a nearly stable plateau. At the beginning of the curing process, the results at 100°C increase fastest. However, a two-step character of the thermal diffusivity increase is visible here.



2 Development of the thermal diffusivity of a resin during curing versus time at 60°C (squares), 80°C (circles) and 100°C (triangles)

NGB · Application Note 0 12 Part 2 · E · 0612 · Technical specifications are subject to change.

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