Climatic testing of electrical components

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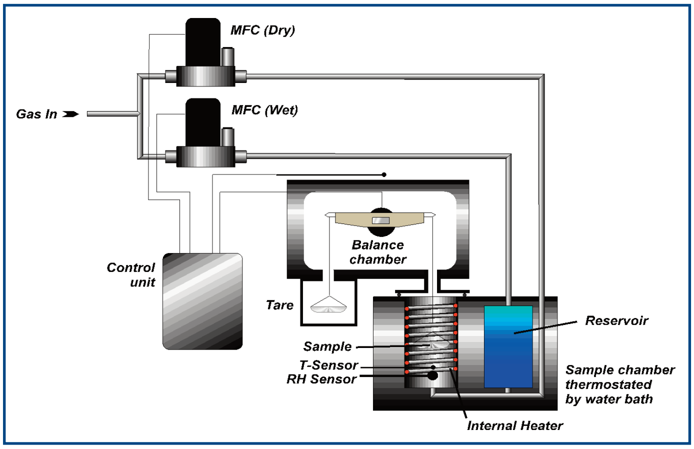
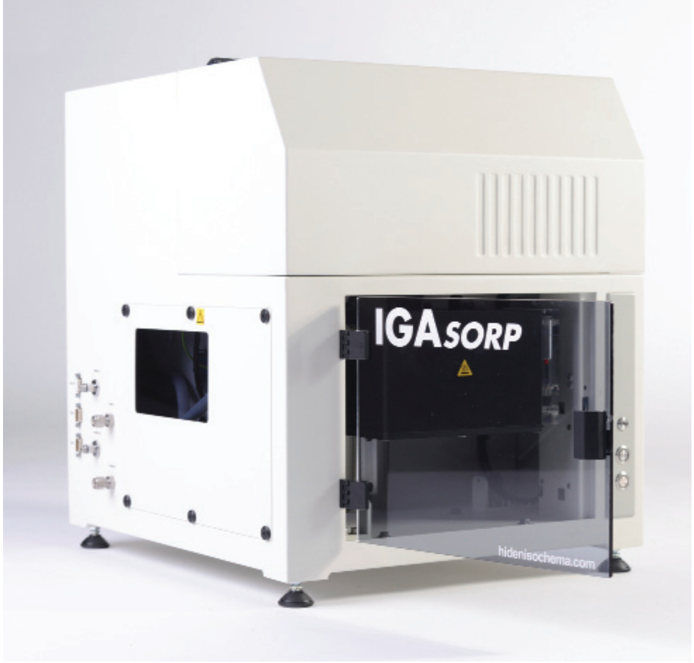
The electrical conductance of a material may vary with moisture content. Therefore the quality of an electrical component may degrade due to the diffusion of moisture into the material from the atmosphere. For this reason an international standard was devised for materials to be used as electrical components. Details of testing methods are presented in the Specification CEI/IEC 749:1996. The test methods are designed to provide accelerated testing criteria which correspond to conditions found in normal use of electrical components.

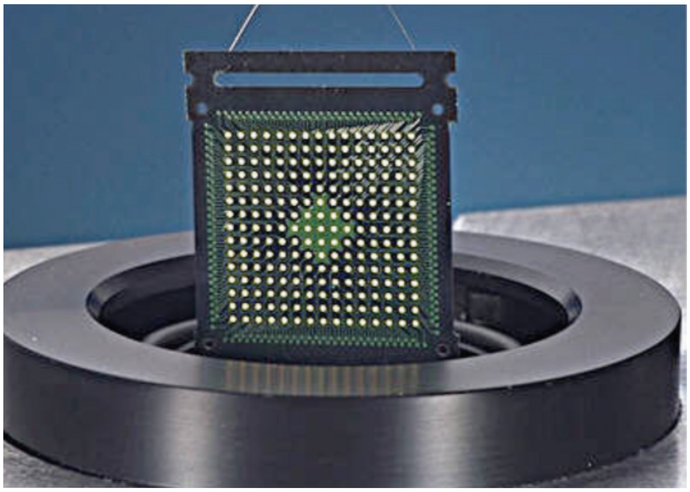


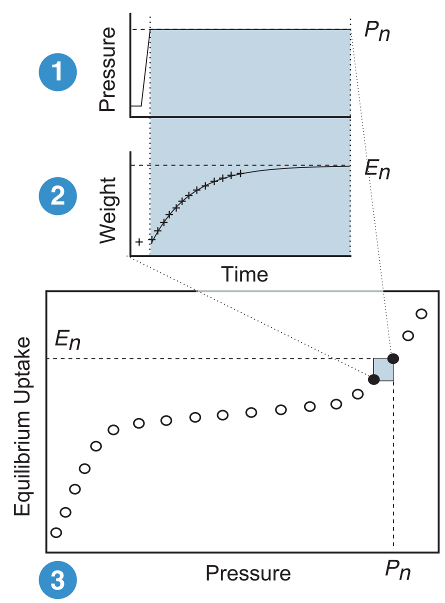
Schematic Representation of IGAsorp.



The IGAsorp CT Analyser was utilised to determine the moisture content of an electrical component at 85 °C, 85%RH in accordance with the above specification.

51mg of sample was loaded into the IGAsorp using the in-situ weighing facility. The sample was heated to 85 °C and dried in atmospheric flowing nitrogen. The sample weight was continuously monitored in order to determine the dry weight of the sample.





The IGA Method

1. The gas pressure or composition in the balance chamber is ramped to the setpoint, P_n, and then held constant through active control of the inlet gas flow
2. The weight change is analyzed in real time to determine kinetic parameters and simultaneously predict the equilibrium point, E_n
3. Equilibrium points are then collected, corrected for buoyancy, and plotted as an isotherm

The measurement was fully automated via a software driven isothermal mode. The temperature was regulated at 85 °C with a stability of +/- 0.1°C. The relative humidity was then stepped from dry to 85%RH and the resulting relaxation in mass was monitored. The unique IGA method real time analysis was used to automatically fit to the mass data in order to minimise test time by predicting the equilibrium weight. The kinetic rate constant of the reaction was also determined from the fit. The data obtained, uptake as a % of dry weight, %RH and sample temperature are plotted as a function of time and presented in figure 1.

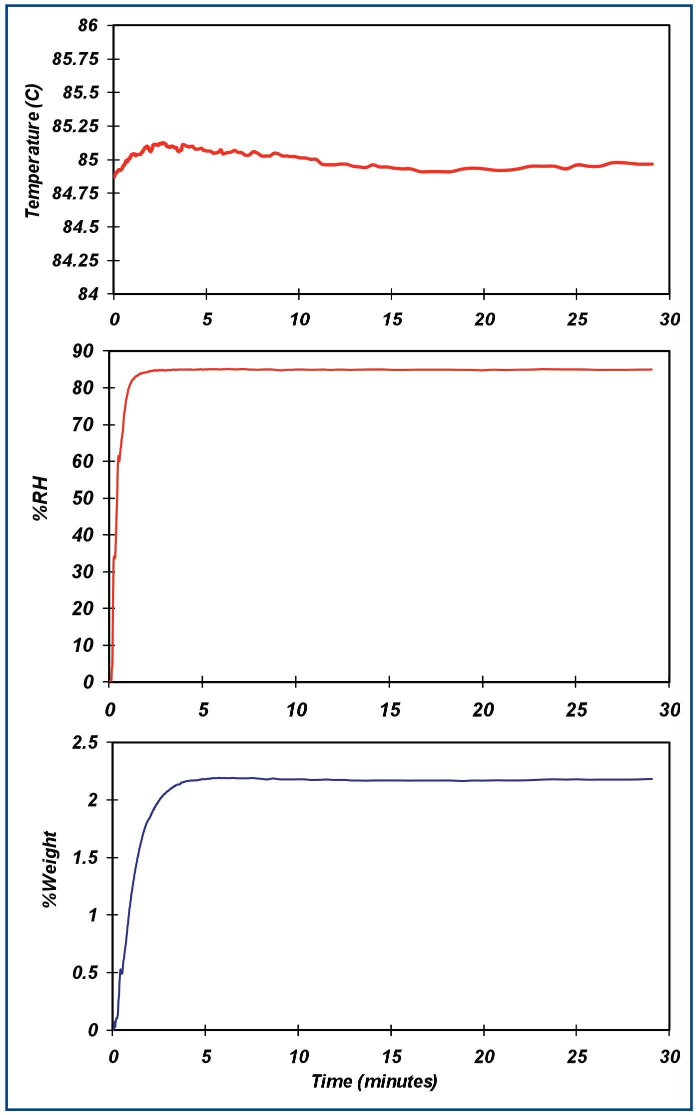


Figure 1: Climatic Testing of Electrical Components in Accordance with Specification CEI/IEC 749:1996 using the IGAsorp CT Analyser

Conventional soak time methods can be performed with this instrument but by utilising the above mentioned unique IGA method real time analysis, test time can be reduced by a factor of 100.

High temperature pre-heating is a requirement of several of the test methods, therefore the IGAsorp CT features a high temperature heater capable of heating the sample to 250 °C.

The above tests require precise control of temperature and humidity combined with accurate moisture content determination. The IGAsorp CT analyser is designed specifically for such conformance testing of devices and materials.

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