CFT Centre for Industrial Technology

IN FOCUS

glass analyses

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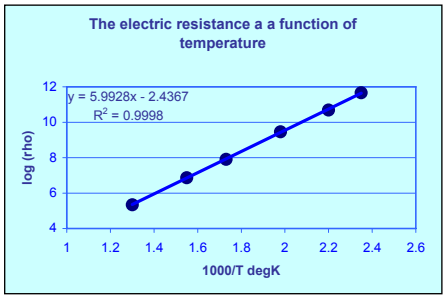
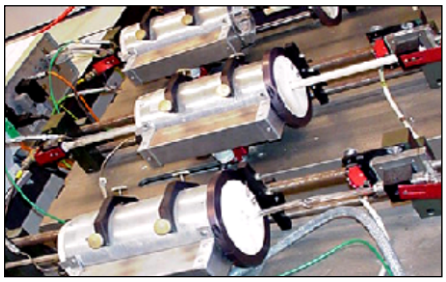
Determination of the specific resistance of glass below the transformation temperature





Method description

A glass sample, length 25 mm, diameter 5-7 mm □ or ○, with conductive coated end faces is clamped between two measuring electrodes. The probe is placed in a furnace and the DC resistance is measured at a stabilised temperature. In the measuring range, 15°C up to Tg, six temperatures are chosen.
The relation between the specific resistance and the temperature is described by the Rasch-Hinrischen equation:

$$\text{Log}(\rho) = A + B/(T+273.15)$$

The constants A and B are determined from a linear data fit and the derived quantities can be calculated.

Measured Quantity

Electrical resistance (Ω).

Derived Quantity

Specific resistance ρ in Ω.cm.

T(ρ) : temperature at which log(ρ) = 6.52
Tk(100) : temperature at which log(ρ) = 8.00
log(ρ)(T) : logarithm of the specific resistance at temp T.

Measuring Range

Specific resistance : 10^5 - 10^{12} Ω.cm.
Temperature : 150 - 575°C.

Precision

T(ρ) and Tk(100) : σ < 3°C.
log(ρ)(T) : σ < 0.1

Accuracy

Resistance measurement: <1%.

Possible Errors

Surface conduction can significantly influence the bulk resistance. Water adsorption on the surface at temperatures below 150°C can result in an apparently decreased bulk resistance.

Sampling

Preferably a glass sample with length 25 mm, diameter 5-7 mm □ or ○, should be available.

Calibration

No absolute reference materials are available. Measurements are calibrated against a Philips reference glass.

Measuring time

2 days

Cost aspect

1 man hour