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National Drug Packing Container (Material) Standard

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Test for coefficient of mean linear thermal expansion

平均线热膨胀系数测定法

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Test for coefficient of mean linear thermal expansion

This method specifies the method of determining the average linear thermal expansion coefficient of elastomeric glass far below the transition temperature.

This method is applicable to the determination of the average linear thermal expansion coefficient of medical glasses of different materials.

Definition

(1) Average linear thermal expansion coefficient α (t_0; t)

It refers to, in a certain temperature interval, the ratio of the length change of the test product and the temperature interval and test product initial length, which is expressed by the formula (1):

$$\alpha(t_0;t)=\frac{1}{L_0}\times\frac{L-L_0}{t-t_0} \qquad (1)$$

Where

t_0 is the initial temperature or reference temperature, °C;

t is the actual temperature of the test product, °C;

L_0 is the length of the glass test product at the temperature t_0 during the test, mm;

L is the length of the test product at the temperature t, mm.

This method specifies that the nominal reference temperature t_0 is 20 °C, so the mean linear thermal expansion coefficient is expressed as α (20 °C; t).

(2) Transition temperature t_g

It refers to the temperature when the glass has a dynamic viscosity of $10^{12.3}$ Pa • s, which represents the transition of the glass from the brittle state to the viscous state, AND it corresponds to the temperature at the intersection of the tangent line of the high temperature portion and that of the low temperature portion of the thermal expansion curve.

Instrumentation

(1) Device used to measure the length of the test product, in the accuracy of 0.1%.

(2) Push rod expansion instrument (horizontal or vertical), which can measure the length change of the test product of $2x10^{-5}L_0$ (i.e. 2 μm / 100 mm).

The contact force of the length gauge shall not exceed 1.0 N. This force acts through the contact between the plane and the sphere, AND the radius of curvature of the sphere

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