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JIS

JAPANESE INDUSTRIAL STANDARD

Testing method for thermally stimulated current of plastic films

JIS K 7131—1994

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In the event of any doubt arising,
the original Standard in Japanese is to be final authority.

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Testing method for thermally stimulated current of plastic films

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1. Scope This Japanese Industrial Standard specifies the testing method for thermally stimulated current (hereafter, referred to as "TSC") of plastic films.

Remarks: The following standards are cited in this Standard:

JIS B 7503 Dial gauges

JIS B 7507 Vernier, dial and digital callipers

JIS K 6900 Plastics — Vocabulary [ISO 472: 1988]

JIS K 7100 Standard atmospheres for conditioning and testing of plastics

2. Definitions For the main terms used in this Standard the definitions in JIS K 6900 apply, and the rest of the terms are as follows:

(1) thermally stimulated current (TSC) A current flowing through an external circuit biting a test piece of dielectric or insulation such as plastic when the test piece transfers to thermal equilibrium because frozen dielectric polarization and trapped electricity at low temperature are released due to raising temperature (see Fig. 1).

(2) poling electric field A d.c. electric field which is applied to a test piece in order to cause dielectric polarization or accumulation of an electric charge to be trapped.

(3) relaxation time A characteristic time constant which is a reference for time required for relaxation, which is expressed by the following formula:

$$\tau = \tau_0 \exp\left(\frac{H}{kT}\right)$$

where, τ : relaxation time of dipole polarization (s)

τ_0 : a constant concerning vibrational angular frequency of bipole (s)

k : Boltzmann's constant [1.3807×10^{-23} (J/K)]

H : activation energy of orientation polarization of dipole (J)

T : absolute temperature (K)

(4) dipole polarization Polarization based on orientation of dipole moment of a polar molecule, which is expressed by the following formula:

$$P_0 = \frac{N\mu^2 E_p}{3kT_p}$$