INTERNATIONAL STANDARD

ISO 12127

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Clothing for protection against heat and flame — Determination of contact heat transmission through protective clothing or constituent materials

Vêtements de protection contre la chaleur et la flamme — Détermination de la transmission thermique par contact à travers les vêtements de protection ou leurs matériaux constitutifs

Reference number
ISO 12127:1996(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 12127 was prepared by Technical Committee ISO/TC 94, *Personal safety – Protective clothing and equipment*, Subcommittee SC 13, *Protective clothing*.

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Clothing for protection against heat and flame — Determination of contact heat transmission through protective clothing or constituent materials

1 Scope

This International Standard specifies a test method for the determination of contact heat transmission. It is applicable to protective clothing (including hand protectors) and its constituent materials intended to protect against high contact temperatures.

Application of this International Standard is restricted to contact temperatures between 100 °C and 500 °C.

2 Definitions

For the purposes of this International Standard, the following definitions apply.

2.1 contact temperature, T_c: Surface temperature of the contact area of the heating cylinder; this temperature is kept constant.

2.2 start of timing: Moment when the upper surface of the calorimeter and the bottom edge of the heating cylinder are within 10 mm of each other.

2.3 threshold time t_t: Time between the start of timing and the moment when the temperature of the calorimeter is 10 °C above its starting value.

2.4 contacting speed: Relative speed with which the heating cylinder and the calorimeter with the test specimen are brought into contact with each other.

2.5 contact force: Force acting on the test specimen and the calorimeter when they have been brought into contact with the heating cylinder.

3 Principle

The heating cylinder is heated to and maintained at the contact temperature and a test specimen is placed on the calorimeter. The heating cylinder is lowered onto the test specimen supported by the calorimeter or, alternatively, the calorimeter with the specimen is lifted up to the heating cylinder. In either case the operation is carried out at a constant speed. The threshold time is determined by monitoring the temperature of the calorimeter.

4 Apparatus

4.1 Heating cylinder

The heating cylinder shall be constructed from a suitable metal which can withstand temperatures of over 500 °C (e.g. pure nickel). Figure 1 shows an example of the heating cylinder. The contact surface shall have a diameter of (25,2 ± 0,05) mm and shall be surface ground. There shall be a central boring which ends 3 mm above the lower surface of the heating cylinder. This boring is intended to hold the temperature sensor, which is necessary for regulation of the temperature of the heating cylinder, and its diameter should be chosen accordingly. A spiral slot of depth D, width B and pitch Z shall be machined in the upper part of the heating cylinder. The values of D, B and Z shall be chosen in such a way that the total heated length of a heating conductor can be placed in the slot. The heating cylinder shall be enclosed by heat-resistant insulation, leaving free the bottom contact surface.

4.2 Calorimeter

The calorimeter (as shown in figure 2) consists of a cylindrical disc of black anodized pure aluminium of (25 ± 0,05) mm diameter and (5 ± 0,02) mm thickness, which is fixed on a mounting made from polyamide 66. The upper contact surface of the calorimeter shall be surface ground before anodization

and on the lower surface a temperature sensor (e.g. platinum resistor) shall be fixed.

4.3 Assembly

Figure 3 shows an example of the assembly. The heating cylinder and calorimeter are mounted with parallel faces and with their symmetrical axes in line in a supporting frame. Provision shall be made for moving at a controlled speed either the heating cylinder down towards the calorimeter or the calorimeter up towards the heating cylinder. The additional weight shall be dimensioned in such a way that the contact force is (49 ± 0,5) N. Between measurements, during cooling periods, a suitable shielding shall be put between the heating cylinder and the calorimeter in order to prevent the calorimeter from being heated by thermal radiation from the heating cylinder.

4.4 Electronic devices

Suitable electronic devices shall be provided to

— heat the heating cylinder to at least 500 °C and to maintain the temperature;

— control the contacting speed;

— measure and register the calorimeter temperature to an accuracy of ± 0,1 °C;

— measure the threshold time.

5 Sampling and conditioning

5.1 Sampling

At least three circular test specimens of 80 mm diameter shall be taken for each contact temperature from the product or from a piece of the material intended for manufacture of the product.

5.2 Conditioning

Before the test, the test specimens shall be conditioned for at least 24 h in an atmosphere having a temperature of (20 ± 2) °C and relative humidity of (65 ± 5) %.

6 Test method

6.1 Starting conditions

The measurements shall be carried out in an atmosphere having a temperature of (20 ± 5) °C and relative humidity between 15 % and 80 %. The heating cylinder shall be brought to ± 2 % of the selected contact temperature (in degrees Celsius). The temperature of the calorimeter shall be at room temperature ± 2 °C before the start of each test. The test shall be started not later than 3 min after the test specimen has been taken out of the conditioning atmosphere (see 5.2).

6.2 Procedure

Place the test specimen on the calorimeter so that its outer face is upwards. Remove the shielding between the heating cylinder and the calorimeter and bring the heating cylinder into contact with the calorimeter with a contacting speed of (5,0 ± 0,2) mm/s. Measure and record the temperature of the calorimeter during the test. Carry out at least three measurements at each contact temperature.

6.3 Evaluation

Determine the threshold time t_t to the nearest 0,1 s.

7 Test report

The test report shall contain the following particulars:

a) reference to this International Standard;

b) name of the supplier of the product or material;

c) name, as given by the supplier, and description of the product or material;

d) contact temperature(s) T_c;

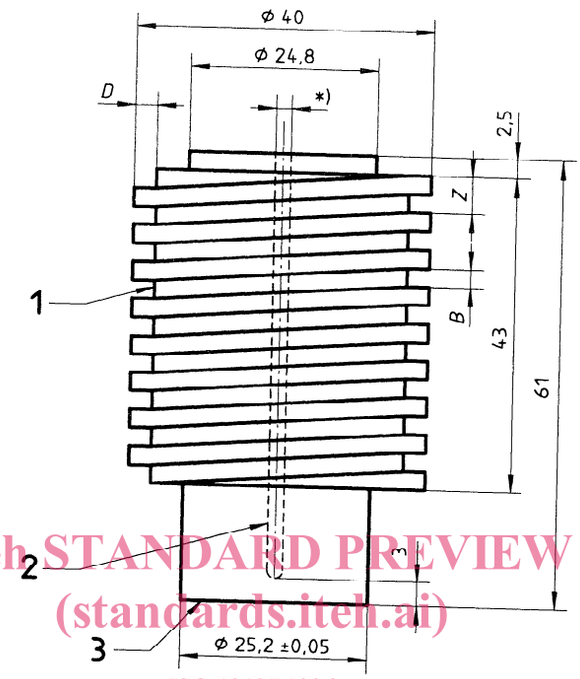
e) threshold time t_t (individual values or, if five or more measurements per contact temperature have been made, the mean value and standard deviation);

f) description of observed changes in the test specimens;

g) date of test;

h) any deviation from the method specified in this International Standard.

Dimensions in millimetres



*) Diameter of the boring appropriate for the temperature sensor.

Key

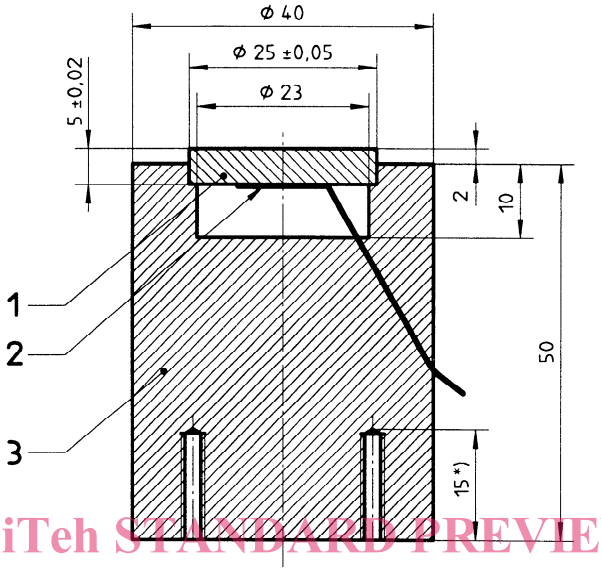
1 Slot for the heating conductor

2 Boring for temperature sensor

3 Contact surface

Figure 1 — Heating cylinder

Dimensions in millimetres



*) Maximum depth of thread holes for mounting the calorimeter.

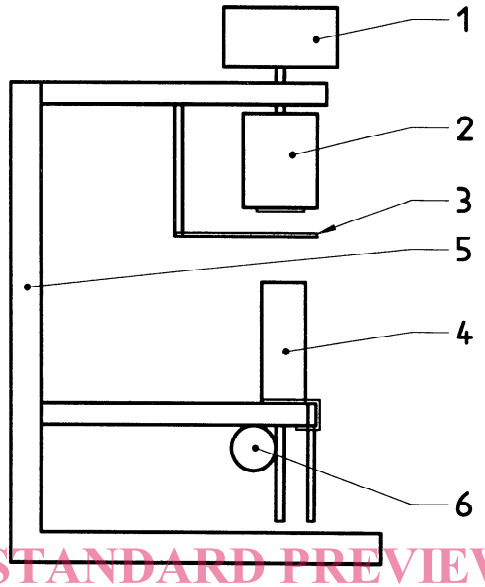
Key

1 Cylindrical disc, made from black anodized pure aluminium

2 Temperature sensor, e.g. platinum resistor

3 Mounting, made from polyamide 66

Figure 2 — Calorimeter



Key

1 Additional weight
2 Heating cylinder with insulation
3 Shielding
4 Calorimeter
5 Supporting frame
6 Motor

Figure 3 — Assembly

ICS 13.340.10

Descriptors: safety, heat protection, fire protection, protective clothing, tests, thermal tests, high temperature tests, determination, heat transfer.

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