

TC94

International Standard



6530

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Clothing for limited protection against dangerous liquid chemicals — Resistance to penetration — Marking

Vêtements assurant une protection limitée contre les produits chimiques liquides dangereux — Résistance à la pénétration — Marquage

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 6530 was developed by Technical Committee ISO/TC 94, *Personal safety — Protective clothing and equipment*, and was circulated to the member bodies in March 1979.

It has been approved by the member bodies of the following countries :

Australia	France	New Zealand
Austria	Germany, F.R.	Romania
Belgium	Hungary	South Africa, Rep. of
Brazil	Israel	Spain
Bulgaria	Italy	Switzerland
Canada	Libyan Arab Jamahiriya	Turkey
Chile	Mexico	
Egypt, Arab Rep. of	Netherlands	

The member bodies of the following countries expressed disapproval of the document on technical grounds :

Poland
United Kingdom

Clothing for limited protection against dangerous liquid chemicals — Resistance to penetration — Marking

1 Scope

This International Standard specifies :

- the characteristics of resistance of clothing to penetration by chemicals;
- the test method for their assessment;
- the marking requirements.

NOTE — Separate International Standards for other properties (for example physical, mechanical and comfort) are under consideration.

2 Field of application

This International Standard concerns clothing which, by its limited ability to repel liquids provides limited protection against dangerous liquid chemicals¹⁾ intermediate between that afforded by customary workwear and clothing having a high resistance to penetration (see ISO 6529).

Such clothing is for use in operations with chemicals in industry, agriculture and laboratories, when the risks involved are limited and therefore do not require the use of "protective clothing resistant to penetration by dangerous liquid chemicals" which offers better protection but is less comfortable.

The purpose of this clothing is to provide protection against :

- a) occasional exposure to droplets or small drips throughout a working day;
- b) a brief exposure to a low pressure jet or a splash. In this case, protection shall be provided for sufficient time to undress before penetration through the clothing has occurred.

It is unlikely that sufficient protection will be provided against hazards such as :

- a) an escape of liquids from pressurized systems in the near vicinity of the users;

- b) a large spillage or overflow of a liquid on to the user;
- c) squeezing a liquid against the clothing (for example, when leaning against contaminated surfaces, or flexing an arm or knee with liquid trapped between the folds, etc.);
- d) exposure to liquids of low surface tension (for example the majority of organic solvents) or of high viscosity;
- e) exposure to hot, highly toxic or corrosive liquids;
- f) exposure to vapours from liquid chemicals.

As this clothing provides only limited protection, it should never be worn next to the skin.

Finally, it is emphasised that the protection may be reduced by normal wear and tear and will probably become non-existent when the clothing is wet.

3 References

- ISO 554, *Standard atmospheres for conditioning and/or testing — Specifications.*
- ISO/R 835, *Graduated pipettes (excluding blowout pipettes).*
- ISO 3205, *Preferred test temperatures.*
- ISO 6529, *Protective clothing resistant to penetration by dangerous liquid chemicals — Classification, designation and marking.*²⁾

4 Resistance to penetration by chemicals

When tested in accordance with clause 5, the resistance to the passage of chemicals from the outside of the clothing to the inside (penetration) shall be such that :

- 1 min after the start of the flow of the test liquid, no stain is noted on the filter paper;
- the efficiency index is at least 90.

These requirements shall be met by all the test pieces.

1) Hereafter referred to as "chemicals".

2) At present at the stage of draft.

5 Method of test

5.1 Principle

Running test liquids over the surface of the test pieces and assessing their capability to repel the test liquids.

The influence of friction between the inside surface of the protective clothing and clothing worn underneath, on the diffusion of liquid by capillarity is not assessed by this test.

5.2 Test liquids

5.2.1 Selection

Use that or those liquid(s) against which protection is required.

NOTE — If necessary, in particular for safety reasons, substitutes may be used, provided that the test laboratory can demonstrate that their effects on the results are similar to those of the chemicals against which protection is required.

5.2.2 Preparation

Use the selected liquid(s) as such.

However, in particular in the case of highly volatile liquids, a dye may be dissolved in the test liquid to facilitate the observation of test liquid passing through the test pieces.

The concentration of dye in the test liquid shall be approximately 0,1 % (V/V).

The dye shall not be absorbed selectively by the test pieces nor affect the surface tension of the test liquid or modify its aggressivity in any other way.

5.2.3 Temperature of application

Test liquids shall be adjusted to the required test temperature (see 5.5).

5.3 Test apparatus

5.3.1 Rigid transparent gutter, of semi-cylindrical shape, with internal diameter 125 ± 5 mm, length 300 ± 2 mm, and inclination 45° .

5.3.2 Graduated pipettes, of capacity 10 ml, class B, type II conforming to ISO/R 835, calibrated for each test liquid so that 10 ± 1 ml of test liquid is delivered within 10 ± 1 s.

5.3.3 Pipette filler (do not mouth pipette).

5.3.4 Mounting device, for maintaining the pipette and the gutter in their required position (see figure 2).

5.3.5 Small beaker.

5.3.6 Balance, accurate to 0,01 g.

5.3.7 Transparent film, resistant to the test liquid.

5.3.8 Filter paper, of thickness 0,16 mm.¹⁾

5.3.9 Stopwatch, accurate to 1 s.

NOTE — The transparent film (5.3.7) and the filter paper (5.3.8) shall be placed between the gutter (5.3.1) and the test piece.

The transparent film shall protect the gutter and obviate the need to rinse it between tests.

The filter paper will show any passage of the test liquid through the test piece.

Test apparatus shall be adjusted to the test temperature (see 5.5) before being used.

5.4 Test sample and test pieces

5.4.1 Preparation of test samples

5.4.1.1 Test samples are finished items of clothing as supplied to the users.

5.4.1.2 Before carrying out the test specified in 5.5, submit the clothing to be tested to cycles of decontamination, washing and/or cleaning and/or reconditioning and drying carried out according to the manufacturer's instructions. The number of cycles shall be that number for which the manufacturer guarantees the protective efficiency of the clothing.

5.4.2 Preparation of test pieces

5.4.2.1 For each test liquid, take six test pieces of 360 ± 2 mm $\times$ 235 ± 5 mm from the clothing, conditioned according to 5.4.1.2.

In the case of woven fabrics, three test pieces are taken in the direction of the warp and three in the direction of the weft.

For non-woven fabrics, if the direction of manufacture is recognizable, take three test pieces in that direction and three at right angles to it. If the direction of manufacture is not recognizable, take three test pieces in any direction and three at right angles to it.

5.4.2.2 Without creasing, fold back and under 30 mm of the length of the test piece and hold the fold in position on both sides by any appropriate means (see figure 1).

1) Whatman No. 1 paper has been found to be suitable.

5.4.2.3 Condition the test pieces at the required test temperature (see 5.5.1) and relative humidity until equilibrium is attained. The conditioning humidity shall be $50 \pm 5\%$ if a test temperature of $23 \pm 2^\circ\text{C}$ is used, otherwise the conditioning humidity shall be $65 \pm 5\%$, in accordance with ISO 554.

5.5 Procedure

WARNING — Since certain hazards are associated with chemicals which may be used in this method, this test should only be carried out by persons acquainted with the hazards and the precautions to be taken.

5.5.1 Carry out the test at a temperature of $23 \pm 2^\circ\text{C}$.

NOTE — A temperature other than the temperature prescribed above may be adopted after agreement between the manufacturer and the user and should be chosen from those specified in ISO 3205.

5.5.2 Cut out $300 \pm 2\text{ mm} \times 235 \pm 5\text{ mm}$ rectangles from the transparent film (5.3.7) and from the filter paper (5.3.8).

5.5.3 Determine the mass of the volume (10 ml) of the test liquid as delivered by the selected pipette (5.3.2). Do this three times and calculate the arithmetical mean of the three values.

5.5.4 Mount the pipette in a vertical position above the centre of the imaginary straight line which joins the apices of the two uppermost corners of the gutter (5.3.1) with the orifice of the pipette 100 mm from the base of the gutter (see figure 2).

5.5.5 Lay consecutively the transparent film and then the filter paper, cut according to 5.5.2, in the gutter so that their surfaces are in close contact. Make sure that there are no creases and that all three lower edges are in line.

Lay the test piece on to the filter paper so that the longer sides of the test piece are parallel to the sides of the gutter. Allow the folded edge of the test piece (see 5.4.2.2) to protrude by 30 mm from the lower edge of the gutter. Again ensure that all surfaces are in close contact and hold the assembly in position by means of the mounting device (5.3.4).

5.5.6 Weigh the beaker (5.3.5) to the nearest 0,01 g. Place it under the folded edge of the test piece with no part of the beaker under the gutter (see figure 2). This ensures that only liquid running off the surface of the test piece is collected.

5.5.7 Fill the pipette with test liquid up to the mark (10 ml) and release the contents, at the same time starting the stop-watch (5.3.9).

5.5.8 Sixty seconds after the start of the flow of the test liquid, observe the appearance of the filter paper through the transparent gutter for signs of penetration.

5.5.9 Lightly tap the gutter to detach any drops hanging from the edge of the test piece. Reweigh the beaker to the nearest 0,01 g and calculate the mass of the liquid in the beaker.

5.6 Expression of results

For each test piece, note if the filter paper is stained. If it is not, calculate the efficiency index, I , of the test piece for that test liquid.

This index is given by the following formula :

$$I = \frac{m'}{m} \times 100$$

where

m' is the mass, in grams, of the test liquid collected in the beaker;

m is the mass, in grams, of the test liquid poured on to the test piece (arithmetical mean — see 5.5).

Express the efficiency index, I , to one significant decimal place.

5.7 Test report

The test report shall state the following information :

- brief description of the clothing and material;
- the positions from which the test pieces were taken;
- the test liquid(s) used and the test temperature;
- all six results (penetration or not, efficiency index).

6 Marking on the clothing

Each independent item of clothing shall be marked legibly and indelibly with the following :

- number of this International Standard;
- the statement "LIMITED PROTECTION";
- name or identification mark of the manufacturer or of his authorized supplier;
- size of the clothing;
- nature of the constituent material(s);
- chemical(s) against which the clothing will provide limited protection and the temperature of application of the chemical(s). Alternatively, the words : "Protective capability of the clothing : see accompanying instruction sheet";
- instructions for decontamination, washing and/or cleaning and/or reconditioning. Alternatively, the words : "For cleaning and maintenance of the clothing : see accompanying instruction sheet".

7 Information to be given on a sheet accompanying the clothing

Each independent item of clothing shall be accompanied by a sheet giving the following information :

- a) number of this International Standard;
- b) name or identification mark and address of the manufacturer or of his authorized supplier;
- c) brief description of the clothing;

d) conditions for use of the clothing, particularly limitations for use (see clause 1) and, if this information is not marked on the clothing, the chemical(s) and temperature of the chemical(s) against which the clothing provides a limited protection;

e) instructions for decontamination, washing and/or cleaning and/or reconditioning, if such instructions do not appear on the clothing.

It is recommended that a space on the sheet should be left for recording successive dates of use, decontamination, washing, cleaning, reconditioning and inspection of the clothing.

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