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Protective clothing — General requirements

Vêtements de protection — Exigences générales

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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 13688 was prepared by Technical Committee ISO/TC 94, *Personal safety – Protective clothing and equipment*, Subcommittee SC 13, *Protective clothing*.

Annexes A and B are for information only.

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Introduction

This International Standard is a reference standard to be called up as appropriate by specific standards. This standard cannot be used alone but only in combination with the specific standard.

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Protective clothing — General requirements

1 Scope

This International Standard specifies general requirements and recommendations for ergonomics, ageing, sizing and marking of protective clothing, and for information supplied by the manufacturer.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 105 (all parts), *Textiles — Test for colour fastness*.

ISO 3175:1995, *Textiles — Evaluation of stability to machine dry-cleaning*.

ISO 3635, *Size designation of clothes — Definitions and body measurement procedure*.

ISO 3758, *Textiles — Care labelling code using symbols*.

ISO 5077, *Textiles — Determination of dimensional change in washing and drying*.

ISO 6330, *Textiles — Domestic washing and drying procedures for textile testing*.

3 Terms and definitions

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

3.1

harm

physical injury or damage to the health of people

3.2

hazard

potential source of harm

NOTE There are different general types of hazards, e.g. mechanical hazards, chemical hazards, cold hazards, heat and/or fire hazards, biological agents hazards, radiation hazards.

Certain of these types of hazards can, according to circumstances, derive from more specific hazards. Thus, a heat hazard can derive from contact heat, radiant heat, etc., and for each of which there may be separate test methods.

Particular garments have been designed to give protection against the hazards encountered in specific types of work. Examples of such garments are aprons that provide protection against hand knives, trousers for use with chainsaws, clothing for protection against foul weather, high visibility clothing and motorcycle rider's protective clothing.

3.3 risk

combination of the probability of occurrence of harm and the severity of that harm

3.4 protective clothing

clothing which covers or replaces personal clothing, and which is designed to provide protection against one or more hazards

3.5 ageing

change of one or more initial properties of protective clothing materials during the passage of time

3.6 level of performance

number that designates a particular category or range of performance by which the results of testing can be graded

NOTE 1 The results of the application of an appropriate test method enable the performance of protective clothing to be assessed against the possible effects of a hazard. It is appropriate in many cases for such results (from each test method) to be graded into a set of up to five levels of performance, whereby a high-level number corresponds to a high performance.

Specific standards can thus define a number of sets of levels of performance, each set being derived by grading the results from the corresponding test method.

NOTE 2 Since levels of performance are based upon the results of testing in a laboratory, they do not necessarily relate to actual conditions in the workplace. Thus protective clothing should be selected with a full appreciation of the conditions and tasks related to the end-user process, taking account of the risks involved and of the data supplied by the manufacturer in relation to the performance of the protective clothing against the hazard or hazards in question.

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4 Ergonomics

Protective clothing should be designed and manufactured as follows.

- a) The materials and components of protective clothing shall not be known to adversely affect the wearer.
- b) It should offer the wearer the best possible degree of comfort that is consistent with the provision of adequate protection.
- c) Parts of the protective clothing that can come into contact with the user should be free of roughness, sharp edges and projections that could cause excessive irritation or injuries.
- d) Its design should facilitate its correct positioning on the user and should ensure that it remains in place for the foreseeable period of use, taking in to account ambient factors, together with the movements and postures that the wearer could adopt during the course of work. For this purpose, appropriate means, such as adequate adjustment systems or adequate size ranges, should be provided so as to enable protective clothing to be adapted to the morphology of the user.
- e) It should be as light in weight as possible without prejudice to the design strength and efficiency.
- f) Where applicable, protective clothing design should take into account other items of protective clothing or equipment which must be worn to form an overall protective ensemble. The same level of protection should be provided at interface areas, such as sleeve to glove, trouser cuff to footwear and hood to respirator.

Where permissible, protective clothing shall have a low water vapour resistance. The test method(s) for water vapour resistance shall be specified in the specific standard.

NOTE 1 An international test method is standardized in ISO 11092. Other test methods exist in national standards. The manufacturer may apply a different reproducible method for e. g. quality supervision to test the water vapour permeability for use other than classification or testing to meet specified values as laid down in related standards.

NOTE 2 If, because of the protection required, water vapour permeability is not possible, then the protective clothing should reduce the physiological strain as much as possible (e.g. by ventilation).

5 Ageing

5.1 General

Ageing can be caused by a single factor or several factors. This International Standard is only concerned with the detrimental effects of colour alteration, cleaning and dimensional change to the levels of performance (see 5.2 to 5.4).

5.2 Colour fastness

If the specific standard contains requirements for colour fastness, protective clothing shall be tested in accordance with the relevant part of ISO 105 (for example ISO 105-B02, colour fastness to artificial light: xenon arc fading lamp test).

5.3 Cleaning

If the specific standard contains requirements for checking the detrimental effects of cleaning, the test procedure shall be as follows, unless stated otherwise in a specific standard.

If care labelling allows washing or dry cleaning and/or finishing, then the protective clothing shall be washed in accordance with ISO 6330 or dry cleaned in accordance with ISO 3175:1995 (clauses 8 and 10 are not applicable) and/or finally finished.

The appropriate number of cleaning processes shall be defined in the specific standard.

If washing is permitted as well as dry cleaning, then both procedures shall be carried out on one sample with half the specified number of processes mentioned in the specific standard.

5.4 Dimensional change due to cleaning

The test procedure for dimensional change on washing shall be carried out in accordance with ISO 5077, and for dry cleaning in accordance with ISO 3175.

Change in dimensions of material for protective clothing shall not exceed $\pm 3\%$ in either length or width, unless stated otherwise in a specific standard.

One sample shall be subjected to five washing or dry cleaning processes. If both washing and dry cleaning are permitted, the sample shall only be washed.

6 Size designation

In the size designation of protective clothing (excluding hand-, head- and foot-protective equipment), measurements have been so specified that they will define a body size.

Measure the body in accordance with ISO 3635. The arm length is the distance between the wrist and the highest point of the armband on the edge of the shoulder, measured on top of the arm with the arm hanging straight.

The control dimensions for protective clothing shall be height, chest or bust girth, and waist girth.

The size designation of each garment shall comprise at least two control dimensions in centimetres.

These two control dimensions shall be either

- the height and chest or bust girth, or
- the height and the waist girth.

Height and girth ranges shall be according to Table 1.

Table 1 — Height and girth ranges of body measurements

Dimensions in centimetres

Height (intervals 6 cm)	Chest or bust girth (intervals 4 cm)	Waist girth (intervals 4 cm)
152 - 158	76 - 80	56 - 60
158 - 164	80 - 84	60 - 64
164 - 170	84 - 88	64 - 68
170 - 176	88 - 92	68 - 72
176 - 182	92 - 96	72 - 76
182 - 188	96 - 100	76 - 80
188 - 194	100 - 104	80 - 84
	104 - 108	84 - 88
	108 - 112	88 - 92
	112 - 116	92 - 96
	116 - 120	96 - 100
	120 - 124	100 - 104
		104 - 108
		108 - 112
		112 - 116

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The ranges in Table 1 may be used in any combination. The total range of these values may be enlarged by using the above-mentioned appropriate intervals (e.g. height 194 - 200). For garments manufactured in a few sizes only, the appropriate size shall be indicated by combining several body size intervals (e.g. height 170 - 194).

The manufacturer can also designate additional measurements (e.g. arm length, inside leg length). The value shall correspond to the actual length expressed in centimetres.

The standard pictogram according to ISO 3635 shall be used as a means of indicating the size.

Height, chest or bust girth, and waist girth shall be designated as ranges expressed in centimetres. The arm length and inside leg length shall be a single value.

Examples of size designations are shown in annex A.

7 Marking

7.1 General marking

Each piece of protective clothing shall be marked.

The marking shall be:

- on the product itself or on labels attached to the product;

- affixed so as to be visible and legible;
- durable for the appropriate number of cleaning processes.

If marking on the product reduces the performance level of the protective clothing, or impedes its preservation, or is incompatible with the application, marking shall be on the smallest commercial packaging unit.

The marking and the pictograms should be large enough to convey immediate understanding and to allow the use of readily legible numbers.

NOTE The use of numbers not smaller than 2 mm and pictograms not smaller than 10 mm (including the frame) is recommended. Numbers and pictograms are recommended to be black on white background.

7.2 Specific marking

The marking shall include the following information.

- a) Name, trademark or other means of identification of the manufacturer or authorized representative.
- b) Designation of the product or base material type and commercial name or code.
- c) Size designation according to clause 6.
- d) Number of the specific standard (ISO...).
- e) Pictograms and, if applicable, levels of performance.

As a type designation of a hazard or an application, the pictogram shall be used as indicated in the marking requirements of the specific standard (see annex B).

An example of clothing for protection against heat and flame is shown in Figure 1.

The pictogram "operation instruction" (see Figure B.2) may be added to indicate that the manufacturer's instructions have to be consulted.

For non-classified requirements, no numbers need be shown next to the pictogram. For classified requirements, the number indicating the level of performance shall be shown beside the pictogram. These numbers shall always be in the same fixed sequence as required in the specific standard.

NOTE These numbers should be shown beside the pictogram, starting at the right-hand side of the pictogram and going clockwise.

- f) For care labelling, washing or cleaning instructions shall be given in accordance with ISO 3758, if relevant.

If there are specific requirements for marking the number of cleaning processes, then the maximum number of processes shall be stated after "max." next to the care labelling.

EXAMPLE: max. 25 ×

If the manufacturer intends to indicate that the manufacturer's instruction have to be consulted, then the pictogram "ISO 7000-1641 operation instruction" (see Figure B.2) shall be placed in front of the care symbols of ISO 3758.

- g) Consideration should be given to suitable additional marking, e.g. appropriate warnings.