TECHNICAL REPORT

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Clothing for protection against heat and flame — General recommendations for selection, care and use of protective clothing

Vêtements de protection contre la chaleur et les flammes — Recommandations générales pour la sélection, l'entretien et l'utilisation des vêtements de protection

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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 2.

The main task of technical committees is to prepare International Standards. 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.

In exceptional circumstances, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example), it may decide by a simple majority vote of its participating members to publish a Technical Report. A Technical Report is entirely informative in nature and does not have to be reviewed until the data it provides are considered to be no longer valid or useful.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/TR 2801 was prepared by Technical Committee ISO/TC 94, *Personal safety — Protective clothing and equipment*, Subcommittee SC 13, *Protective clothing*.

ISO/TR 2801 cancels and replaces ISO 2801:1998, which has been technically revised. ISO/TR 2801 is based on CEN/TR 14560:2003.

Introduction

The information in this Technical Report has been produced to assist employers (or people who advise employers) in making the necessary decisions regarding the selection, use, care and maintenance of protective clothing, for employees exposed to risks related to heat and flame (e.g. welding, firefighting).

The purpose of this Technical Report is to highlight the main areas that an employer needs to consider. Most paragraphs of this Technical Report contain bullet-lists. These lists are provided to give guidance only and are not exhaustive.

Normative references are not provided in this Technical Report. All references are of an informative nature only. Annex A gives details of the current International Standards relating to clothing designed to provide protection from heat and flame.

For European legislation on personal protective equipment (PPE), see Directive 89/656/EEC and Directive 89/686/EEC.

Clothing for protection against heat and flame — General recommendations for selection, care and use of protective clothing

1 Scope

This Technical Report sets out guidance for the selection, use, care and maintenance of clothing designed to provide protection against heat and flame.

2 Terms and definitions

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

2.1
hazard
substances, situations or events that can cause harm/injury

2.2
risk
combination of the probability of the occurrence of a hazard in a particular situation and the consequences or extent of harm to the individual to be expected from the hazard

2.3
selection
the process of determining the type of protective clothing assembly (garment) that is necessary for the required protection

2.4
use
application of protective clothing including its limitations

2.5
care
keeping in good working order, including procedures for cleaning, decontamination and storage

2.6
maintenance
procedure for inspection, care and repair with the aim of retaining the protective properties and preventing excessive deterioration of the clothing

3 Selection

3.1 General

Subject to requirements, the process of selecting protective clothing can be divided into a number of stages.

3.2 Risk assessment

The process of carrying out a risk assessment should include:

— identification of the activities to be undertaken by the person(s) who will require to wear the protective clothing;

— a list of the hazards present;

— a quantification of the risks that would result from exposure to the hazards;

— considerations of the protection provided by other control measures before the application of PPE;

— determination of the level and extent of protection required from the protective clothing (in absolute or relative terms);

— determining whether adding badges to a garment may increase the risk (e.g. adding a badge may create a raised surface to which molten splash can cling).

A number of risk assessment models may be used to determine the level of risk associated with the activities. Annex B gives reference to some of the existing documents on this subject.

3.3 Defining the level of protection required for each activity from the protective clothing

The process of defining the level of protection required for each activity from the protective clothing should include:

— determining what parts of the body require protection;

— identifying the appropriate standard or method which will provide the protection required;

— determining the level(s) of protection required (for the relevant parts of the body) in relative or absolute terms for each item of protective clothing.

Annex C provides guidance and examples of hazards and applicable standards.

3.4 Collecting information on available protective clothing

The process of collecting information on available protective clothing should include:

— carrying out market research to determine products that are available;

— obtaining information from the potential suppliers on performance levels and manufacturer information;

NOTE 1 Depending on the region, some types of protective clothing can be subject to specific requirements and are therefore certified by a notified body.

— gathering information from comparable organizations using similar items of protective clothing for similar tasks;

— determining compatibility of all items of PPE to be used.

NOTE 2 If after collating all available data, it is established that suitable protective clothing is not available, then it can be necessary for an organization to carry out research and development work.

Annex A provides a list of the relevant ISO standards for clothing designed to protect against heat and flame.

3.5 Wearer trials

The purpose of a wearer trial is to assess the compatibility and the ergonomic practicality of the protective clothing. Obtaining feedback from the intended users is imperative at this stage, as such information will provide valuable data relating to the practical performance of the protective clothing, and also give confidence to the users, thus ensuring that the selected items are used.

When conducting wearer trials, the following issues should be considered:

a) ease and speed of putting on and taking off;

b) ease and extent of adjustability;

c) acceptance in terms of comfort and weight;

d) compatibility with all other items of PPE;

e) ability to undertake all tasks expected without hindrance or difficulty;

f) preservation of the protection in all working positions;

g) whether adding badges to a garment may increase the risk, i.e. the positioning of a badge (e.g. will it be in a high risk area?) and the type of badge (e.g. is it flame retardant?) should be considered;

When wearer trials are conducted a systematic approach should be adopted:

— participants should be selected based on a cross section of the relevant occupational group (height, weight, age, gender, etc.);

— participants should evaluate individually each item of the protective clothing assembly they wear;

— evaluation feedback should be obtained in a structured manner allowing for both qualitative and quantitative data collection and analysis: this may be achieved by using a structured questionnaire, structured or semi-structured interviews and/or group discussions;

— the number of participants should be sufficient to ensure that the results obtained are statistically significant and representative of the total workforce.

3.6 Additional testing

To assist any decision making process, additional testing may be required, e.g.

— instrumented manikin testing;

— laboratory testing:
  — assessment of/behaviour after laundry/cleaning;
  — assessment of/behaviour after decontamination;
  — assessment of/behaviour after UV exposure;
  — abrasion resistance;
  — chemical repellency.

3.7 Other considerations

In order to establish the overall performance and the total cost of ownership of the protective clothing, other considerations may need to be made, e.g.

— is training offered as part of the procurement package (including training provided by third parties)?

— is a post procurement service offered?

— what quality assurance measures are in place prior to the delivery?

— what are the requirements for cleaning and decontamination?

— what are the inspection and maintenance requirements?

— what are the replacement requirements and costs for components?

— what is the delivery time for standard and special sizes?

— what sizes are available?

— are stock items held by the supplier?

— what are the collection and delivery arrangements?

— should stock be held within the organization?

— how is the internal distribution to the users to be organized?

— how is the protective clothing to be safely disposed of?

— can corporate/role identity be incorporated without affecting performance?

NOTE When the outcome of a selection process results in the employer providing a number of items of protective clothing for different tasks/activities, the user/wearer can be permitted (after being provided with appropriate training) to select the item(s) that provide the necessary protection at the time of use. Any selection made at that stage is based upon the risk assessment carried out by the employer or based upon an informed dynamic risk assessment by the user at the time of use.

4 Use

4.1 General

After the selection of the protective clothing, a number of stages should be followed to ensure its correct use.

4.2 Training

All employees/users should be trained how to use their protective clothing correctly, prior to the equipment being introduced into active service. Such training should include:

a) information concerning limitations and capabilities of the protective clothing:

— what the protective clothing will protect from;

— what the protective clothing will not protect from;

— what the effects are (if any) of long term use;

b) how to use/wear the protective clothing;

c) the importance of complying with the manufacturers or suppliers instructions;

d) how to store the protective clothing when not in use;

e) information concerning arrangements for cleaning and decontamination;

f) how to determine when the protective clothing is no longer fit for purpose and should be discarded;

g) procedures for discarding clothing no longer fit for purpose in an environmentally correct way;

h) how to obtain replacements;

i) the importance of using garments which are not contaminated by inflammable liquids or substances which could create a spontaneous combustion.

NOTE The instructions/training provided to the wearer/user will depend on the level of risk and complexity of the protective clothing to be provided. The provision of written instructions or information might not be sufficient and the users/wearers might need to be involved in practical demonstrations, training and exercise.

4.3 Introducing protective clothing into service

WARNING — When individual items of a PPE ensemble are replaced, care should be taken to ensure that the required level of protection to the body is maintained.

4.4 Record keeping

In the overall management of protective clothing, it is essential to build a full life history for each item, from manufacture to disposal.

Record keeping should incorporate the following:

a) the specification of the protective clothing (manufacturer, delivery date, batch number, ...);

b) the service history of the protective clothing (date of issue, name of wearer, ...);

c) training records of operatives using the protective clothing, including the duration of exposure to risks and the identity of the risks;

d) details of hazards to which the protective clothing has been exposed;

e) information relating to care:

— cleaning (number and conditions);

— decontamination (when, how and by whom);

— storage;

f) records of maintenance:

— inspection (when, how and by whom);

— damage and repair;

— disposal;

g) problems arising from the use of the protective clothing.

These records should be easily available to the current user.

4.5 Routine examination

Each individual item of protective clothing should be examined before and after use. Ideally, the examinations should be carried out by the user, who should be trained appropriately.

Routine examinations should include checks for:

a) soiling;

b) contamination from hazardous materials, including biological agents;

c) physical damage (rips, tears, cuts, missing hardware and closing systems);

d) thermal damage (charring, burn holes, melting, change in colour);

e) damaged or missing accessories (reflective trimming, labelling);

f) on-going evaluation of system fit and interfaces/overlaps.

4.6 In-service evaluation and monitoring

A system should be in place to ensure that the performance of all protective clothing is constantly evaluated and monitored.

The items to be monitored may include:

— accident/injury statistics;

— failure rates of protective clothing, including trends for similar repairs, etc.;

— feedback from users;

— feedback from service companies;

— changes in working conditions and available protective clothing on the market.

5 Care

5.1 General

Protective clothing should be provided with manufacturer information, including care instructions (either on a label attached to the item and/or separately in writing).

Based on this information, the employer should determine the arrangements for care and inform all parties involved (including the user).

Care arrangements should include:

a) cleaning:

   — what cleaning methods should be used?

   — who will carry out the cleaning?

   — when should the items be cleaned?

   — is there third party collection and deliveries?

   — is re-application of finishes/treatments necessary?

b) decontamination:

   — what are the established decontamination procedures?

c) storage:

   — what are the parameters for the storage of the protective clothing (e.g. humidity, temperature, time, light, etc.)?

   — where should the protective clothing be stored?

   — how are the items stored:

      — prior to use?

      — when in use?

      — when not in use?

NOTE See Annex D for guidance regarding labelling.

5.2 Cleaning

Good cleaning practice will ensure that:

— there is limited deterioration to any components of the protective clothing and a preservation of the integrity of protection;

— the items are visibly clean;

— the protective clothing is hygienically clean;

— no unpleasant odour remains;

— there are no residues of the cleaning products;

— the possibility of the size of the garment changing is limited;

— re-application of finishes/treatments is done according to the instructions of the supplier.

WARNING — Flammable residues in garments after cleaning can ignite in proximity to an ignition source.

NOTE 1 The number of cleaning cycles can be a determinant of the operational life of the protective clothing.

NOTE 2 The effectiveness of the cleaning process might need to be confirmed by (batch) testing.

5.3 Decontamination

Items of protective clothing require decontamination when a hazardous substance (both flammable and hazardous for the health of the wearer/user) is present. Examples of hazardous substances include:

— asbestos,

— fuel,

— greases,

— paint,

— body contamination, and

— chemicals.

In order to avoid the risk of cross-contamination and re-contamination of protective clothing, both for individuals and the environment, decontamination procedures should be set in place, giving instructions for the:

a) removal,

b) handling,

c) segregation,

d) storage,

e) transportation,

f) treatment, and

g) disposal

of all protective clothing.

5.4 Storage

Storage arrangements should include the following.

— The storage of protective clothing should be organized so that it remains hygienic and clean until it is required for use.

— The method of storage should not adversely affect the performance characteristics of the protective equipment.

— Soiled protective clothing should be cleaned and dried before storage.

— Protective clothing should be stored in a clean, dry, well-ventilated area, at a temperature that will not adversely affect the items.

— Manufacturers should indicate any specific storage requirements and the user should follow these instructions.

— If the life cycle of the protective clothing is influenced by the storage, this should be indicated by the supplier.

6 Maintenance

6.1 General

Protective clothing should be provided with manufacturer information, including maintenance instructions.

Based on these instructions, the employer should determine the arrangements for maintaining the protective clothing, and they should inform all parties involved (including the user).

Maintenance arrangements should include:

a) inspection;

b) what inspection criteria should be applied;

c) who should carry out the inspections,

d) when inspection should be done;

e) repair;

f) what kind of repairs are acceptable;

g) who will be responsible for the repairs;

h) removal from service and ultimate disposal;

i) when the protective clothing should be disposed of;

j) how the protective clothing should be disposed of ensuring no damage to the environment.

Maintenance should only be performed by trained and competent personnel.

6.2 Inspection

6.2.1 General

Regular inspection of protective clothing is essential to ensure that it will provide the protection intended. Any elements contaminated with hazardous materials, including biological agents, should be decontaminated before inspection is initiated.

Users should conduct a routine examination of their protective clothing before and after each use (see 4.5).

In addition, protective clothing should be inspected by a qualified person appointed to this task. This person needs to be familiar with the protective clothing, the relevant protective clothing standard(s) and the types of wear and tear that could influence the performance. Inspections are necessary to establish that the protective clothing is fit for its purpose and that it still meets with the initial requirements. An inspection programme should be drawn up for each type of protective clothing and should include:

a) an inspection schedule;

b) elements to be inspected;

c) the decisions and actions based on the inspection results.

6.2.2 Inspection schedule

The inspection schedule should include:

a) regular inspections, taking into account any recommendations from the manufacturer;

b) inspections out of the regular scheme:

- after every deployment to an incident;
- whenever the user suspects that the protective clothing is no longer fit for purpose;
- after any repair;
- prior to re-issue;

c) inspections after re-calling a whole batch or type of protective clothing, if damage to the protective clothing, or injury to users, is frequent.

6.2.3 Elements to be inspected

The following elements should be considered during inspection:

a) soiling;

b) contamination of the protective clothing from hazardous materials or biological agents;

c) physical damage to all layers of the clothing (including inner liners – not always possible without destruction);

d) thermal damage to all layers of the clothing (including inner liners – not always possible without destruction);

e) material integrity (including all accessories); UV or chemical degradation;

f) loss of liner material, shifting of liner material;

g) loss of seam integrity; broken or missing stitches;

h) effectiveness of closure systems;

i) performance as stated on the label (batch or random sample testing will be needed in addition to inspection);

j) integrity/legibility of the label;

k) verification that the size of garment has not been more affected than declared in manufacturer's information.

Technical documentation should be available on the pass/fail criteria for all the above elements. In addition to the inspections, it is important to carry out testing (in some cases destructive) to validate the inspection criteria.

6.2.4 Decisions

The decisions based on the inspection results include:

— fit for service;

— fit for limited use only (in this case, the label must be adapted to show this lower level of protection);

— requires repair/alteration;

— requires cleaning/decontamination;

— must be removed from service and destroyed.

6.3 Repairs and alterations

Repairs and/or alterations to protective clothing should only be carried out, following the manufacturer's instructions, by individuals or organizations trained to do so. After repair/alteration, the clothing should be inspected by a suitably qualified person. No repair should adversely affect the performance of the garment. The material used should be of comparable or higher performance to the original. Surface stitching in areas of risk should be done in flame retardant thread.

6.4 Disposal

Protective clothing that is no longer fit for purpose should not re-enter service.

A number of factors should be considered when disposing of protective clothing, e.g.

— the environment;

— the fact that the chosen method of disposal should not compromise the health and safety of anyone coming into contact with the (contaminated) protective clothing.

When an item of protective clothing has been identified as no longer fit for purpose, it should be marked accordingly or kept in a container that clearly identifies the items not to be used and awaiting disposal.

Annex A
(informative)

ISO standards and their performance levels relating to clothing designed to provide protection from heat and flame

A.1 General

This list is based on existing ISO standards at the time of publication.[1)]

The standards listed fall into two categories:

— those which specify performance requirements for garments (see A.2): for these documents, the title and the scope are provided, as well as the performance levels as described within the standard (where applicable);

— those which describe test methods (see A.3): for these documents, only the title is provided.

WARNING — Performance levels mentioned in ISO standards may vary from one edition to the next.

The required level of performance should be chosen following a risk assessment.

A.2 Standards describing performance requirements for protective clothing or materials

— **ISO 13688**, *Protective clothing — General requirements*

ISO 13688 specifies general requirements and recommendations for ergonomics, ageing, sizing and marking of protective clothing, and for information supplied by the manufacturer.

— **ISO 11611**, *Protective clothing for use in welding and allied processes*

ISO 11611 specifies test methods and general performance requirements for protective clothing for operators engaged in welding and allied processes with comparable risks. This type of protective clothing is intended to protect the wearer against small splashes of molten metal, short contact time with flame, and ultraviolet radiation, and to be worn continuously for up to 8 h at ambient temperature.

— **ISO 11612**, *Clothing for protection against heat and flame — Test methods and performance requirements for heat-protective clothing*

ISO 11612 is applicable to protective clothing for workers exposed to heat. The clothing consists of outer garments made from flexible material to protect specific parts of the body. Hoods and gaiters are included but all other types of protection for the head, hands and feet are excluded.

ISO 11612 specifies the performance requirements and methods of test for the protective clothing materials and gives design recommendations for the clothing where necessary.

1) Certain of the standards mentioned are currently under revision.

Protective clothing complying with ISO 11612 is intended to protect workers against brief contact with flame and against at least one type of heat. The heat may be in the form of convective heat, radiant heat, large molten metal splashes or combination of these heat hazards.

— **ISO 11613**, *Protective clothing for firefighters — Laboratory test methods and performance requirements*

The purpose of ISO 11613 is to provide essential performance requirements for protective clothing for firefighters whilst firefighting. The clothing in ISO 11613 can be used by firefighters in other activities subject to a risk assessment.

The clothing in ISO 11613 forms only part of a system of protection and does not protect the head – including the face, hands and feet.

— **ISO 14116**, *Protective clothing — Protection against heat and flame — Limited flame spread materials, material assemblies and clothing*

ISO 14116 specifies the performance requirements for limited flame spread properties of materials and material assemblies used in protective clothing. A classification system is given for materials and material assemblies tested according to ISO 15025, before and after a standard cleaning procedure.

— **ISO 15538**, *Protective clothing for firefighters — Laboratory test methods and performance requirements for protective clothing with a reflective outer surface*

ISO 15538 specifies test methods and minimum performance requirements for reflective protective clothing used in specialized firefighting. This clothing provides protection against flame lick and intense radiant heat and is worn for short periods only, to enable the firefighter to enter specific high-risk firefighting and fire rescue situations which also require the use of breathing apparatus and head, hand and foot protection.

ISO 15538 only covers protective clothing that relies upon the ability of the outer material to reflect intense radiant heat. This type of reflective clothing may also be used for industrial applications involving high levels of radiant heat.

The reflective clothing specified in ISO 15538 for specialized use is not covered in EN 469. Non-reflective protective clothing as specified in EN 469 may also be used for specialized firefighting applications in conjunction with appropriate head, hand, foot and respiratory protection.

— **ISO 14460**, *Protective clothing for automobile racing drivers — Protection against heat and flame — Performance requirements and test methods*

ISO 14460 specifies test methods, performance requirements and design parameters for clothing for protection against heat and flame intended for drivers in automobile competitions. ISO 14460 concerns outer garments, under garments, socks, gloves and balaclava hoods. Shoes and helmets are excluded.

— **ISO 15384**, *Protective clothing for firefighters — Laboratory test methods and performance requirements for wildland firefighting clothing*

ISO 15384 specifies methods of test and minimum performance requirements for protective clothing to be worn in wildland firefighting and associated activities. This clothing is not intended to provide protection during fire entrapment.

ISO 15384 covers the general design of the garment, the minimum level of performance for the materials employed and the methods of test to determine these levels.

ISO 15384 does not cover special garments used in high risk situations, for example structural firefighting, chemical, biological electrical or radiation hazard. It does not cover protection of the head, eyes, hand, feet and respiratory system. These aspects may be dealt with in other standards.

A.3 Standards describing test methods

— **ISO 6942**, *Protective clothing — Protection against heat and fire — Method of test: Evaluation of materials and material assemblies when exposed to a source of radiant heat*

— **ISO 9150**, *Protective clothing — Determination of behaviour of materials on impact of small splashes of molten metal*

— **ISO 9151**, *Protective clothing against heat and flame — Determination of heat transmission on exposure to flame*

— **ISO 9185**, *Protective clothing — Assessment of resistance of materials to molten metal splash*

— **ISO 12127**, *Clothing for protection against heat and flame — Determination of contact heat transmission through protective clothing or constituent materials*

— **ISO 13506**, *Protective clothing against heat and flame — Test method for complete garments — Prediction of burn injury using an instrumented manikin*

— **ISO 15025**, *Protective clothing — Protection against heat and flame — Method of test for limited flame spread*

Annex B
(informative)

Risk assessment

A number of documents on risk assessment and risk assessment models are available, e.g. References [21][22][23] in the Bibliography offer guidance on this subject.

For further reference, readers may contact their national standards bodies.

Annex C
(informative)

Examples of relationship between type of heat/flame hazard and clothing to be chosen for protection

Table C.1 below is presented as a guide, to be used when selecting clothing to protect against heat and flame.

NOTE As it is ultimately the responsibility of the employer to select the most appropriate items of protective clothing, after carrying out a risk assessment, Table C.1 is provided as an explanatory guide only.

WARNING — In selecting the appropriate protective clothing, care must be taken not to overprotect the wearer, as this can lead to discomfort and/or excessive stress that may prove hazardous.

Table C.1 is based on existing ISO standards at the time of publication.[2)]

2) Certain of the standards mentioned are currently under revision.

Table C.1 — Suggested standards and minimum performance levels

Hazard	Example of hazard	Suggested protective clothing
Low level risk: Localized exposure to heat and/or flame		
Small flames – accidental contact	Work in laboratory with risk of contact with flame of Bunsen burner	Clothing manufactured from materials conforming to ISO 11612:1998, level A
Larger flames and convective heat	a) Working beside small fires (e.g. in a production process) b) Fire extinguisher training	Clothing conforming to ISO 11612:1998, levels A, B1, C1
Radiant heat	Working near a furnace in a production process	Clothing conforming to ISO 11612:1998, level A, C1 or Clothing conforming to ISO 15538:2001, Type 1
Clothing propagates flames	Clothing worn over protective clothing against heat and flames offering other types of protection such as against foul weather or low visibility	Clothing conforming to ISO 14116:—[3], level 2
Sparks and small molten metal drops	a) Welding and cutting b) Aluminium and iron foundry work	Clothing conforming to ISO 11611 or Clothing conforming to ISO 11612:1998, levels D1 and/or E1
Medium level risk: Exposure to high levels of heat and/or flame		
Radiant heat	Working close to furnaces	Clothing conforming to ISO 11612:1998, levels A, B2, C2 or Clothing conforming to ISO 15538:2001, Type 2
Radiant heat and occasional flame	Inside kilns	Clothing conforming to ISO 11612:1998, levels A, B2, C2
Convective heat, radiant heat and small molten metal drops	Short circuit electric arc	Clothing conforming to ISO 11612:1998, levels A, B2, C1
Flames, radiant heat and burning debris	Wildland firefighting in open countryside	Clothing conforming to ISO 15384 or Clothing conforming to ISO 11612:1998, levels A, B1, B2, C1
High level risk: Potential exposure to levels of heat and/or flame that can kill almost instantaneously		
Intense heat and flame	Entering a burning building	Clothing conforming to ISO 11613
Flame engulfment	a) Racing driver crash b) Flashover in firefighting	a) Clothing conforming to ISO 14460 b) Clothing conforming to ISO 11613 or Clothing conforming to ISO 15538:2001, Type 3
Radiant heat and large quantities metal splashes	Steel mills	Clothing conforming to ISO 11612:1998, levels A, B2, C3 or C4, D1 to D3 and/or E1 to E3
Surrounded by/in proximity to a large fire	a) Aircraft crash b) Fire in petrochemical storage tanks	Clothing conforming to ISO 11613 or b) Clothing conforming to ISO 15538:2001, Type 3

3) To be published.

Annex D
(informative)

Guidance on some of the items that may be addressed in labelling, subject to the required use of garments

When protective clothing is first issued to the user, a manufacturer's information sheet should be provided with the items concerned. This information sheet, however, may not remain with the clothing, and therefore a label should be referred to for guidance on use/cleaning, etc. Labels are a valuable source of information: it is therefore important not only that the correct information is provided, but also that it remains legible throughout the life of a garment.

ISO 13688 provides a list of topics to be mentioned on the label of protective clothing, including the correct pictograms and their meaning, as well as instructions on the indication of sizes. ISO 3758 gives the different approved care pictograms and their meaning.

Guidance regarding labels includes the following:

— standardization of labelling – size, materials, wording, layout;

— specification of what is safety critical;

— if the garments are to be domestically washed, warnings should be given, e.g. certain types of contaminant can cause contamination of other (domestic or protective) clothing washed at the same time, or after the contaminated protective clothing if washed in the same machine;

— the influence of common domestic cleaners or detergents is not always known and could in some cases damage the protective characteristics of the garments: the user should be warned about this risk;

— all the procedures used in the cleaning, repair, tracking etc. of the protective clothing and their reporting should be in a form that recognizes that the employer, and not the user, is responsible for the performance and maintenance of the protective clothing;

— realistic industrial cleaning instructions should be provided, to enable the removal of soiling but without affecting the function of the protective garment (see 5.2);

— instructions should be provided regarding the removal of hazardous substances, e.g. body contamination, fuel, asbestos, etc.;

— information should be provided regarding the drying of garments;

— details should be provided regarding any special treatments/finishes used and how these should be rejuvenated/replaced;

— durability testing of labels/inks, to the specified cleaning methods, should be carried out prior to the use of the label in protective garments.

Bibliography

[1] ISO 3758, *Textiles — Care labelling code using symbols*

[2] ISO 6942, *Protective clothing — Protection against heat and fire — Method of test: Evaluation of materials and material assemblies when exposed to a source of radiant heat*

[3] ISO 9150, *Protective clothing — Determination of behaviour of materials on impact of small splashes of molten metal*

[4] ISO 9151, *Protective clothing against heat and flame — Determination of heat transmission on exposure to flame*

[5] ISO 9185, *Protective clothing — Assessment of resistance of materials to molten metal splash*

[6] ISO 11611, *Protective clothing for use in welding and allied processes*

[7] ISO 11612:1998, *Clothing for protection against heat and flame — Test methods and performance requirements for heat-protective clothing*

[8] ISO 11613, *Protective clothing for firefighters — Laboratory test methods and performance requirements*

[9] ISO 12127, *Clothing for protection against heat and flame — Determination of contact heat transmission through protective clothing or constituent materials*

[10] ISO 13506, *Protective clothing against heat and flame — Test method for complete garments — Prediction of burn injury using an instrumented manikin*

[11] ISO 13688, *Protective clothing — General requirements*

[12] ISO 14116:—[4)], *Protective clothing — Protection against heat and flame — Limited flame spread materials, material assemblies and clothing*

[13] ISO 14460, *Protective clothing for automobile racing drivers — Protection against heat and flame — Performance requirements and test methods*

[14] ISO 15025, *Protective clothing — Protection against heat and flame — Method of test for limited flame spread*

[15] ISO 15384, *Protective clothing for firefighters — Laboratory test methods and performance requirements for wildland firefighting clothing*

[16] ISO 15538:2001, *Protective clothing for firefighters — Laboratory test methods and performance requirements for protective clothing with a reflective outer surface*

[17] CEN/TR 14560:2003, *Guidance for selection, use, care and maintenance of protective clothing against heat and flame*

[18] EN 469, *Protective clothing for firefighters — Performance requirements for protective clothing for firefighting*

4) To be published.

[19] Directive 89/656/EEC *Council Directive of 30 November 1989 on the minimum safety and health requirements for the use of Personal Protective Equipment on the workplace by the employees (89/656/EEC)*

[20] Directive 89/686/EEC *Council Directive of 21 December 1989 on the approximation of the laws of the Member States relating to personal protective equipment (89/686/EEC)*

[21] MÄKINEN H., Finnish Institute of Occupational Health, 3rd Seminar on PPE in Europe, 1996, *Risk assessment for the selection and use of protective clothing – a practical example*, pp. 57 – 62

[22] MÄKINEN H., Finnish Institute of Occupational Health, 4th Seminar on PPE in Europe, 1997, *A systematic risk assessment and PPE programme*, pp. 113 – 117

[23] BOIX P., VOGUL L., *Risk Assessment at the Workplace, A guide for union action*, Trade Union Technical Bureau for Health and Safety (TUTB)

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