

Australian Standard[®]

**Protective clothing for firefighters—
Requirements and test methods for
protective clothing used for structural
firefighting**



This Australian Standard® was prepared by Committee SF-049, Firefighters Personal Protective Equipment. It was approved on behalf of the Council of Standards Australia on 14 August 2006.

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The following are represented on Committee SF-049:

- Association of Accredited Certification Bodies
 - Australasian Fire Authorities Council
 - Australian Chamber of Commerce and Industry
 - Australian Industry Group
 - Certification Interests (Australia)
 - CSIRO Textile and Fibre Technology
 - Council of Textile and Fashion Industries of Australia
 - Department of Defence Australia
 - Footwear Manufacturers Association of Australia
 - New Zealand Fire Service
 - New Zealand Footwear Industry Association
 - New Zealand Leather and Shoe Research Association
 - New Zealand Manufacturing Interests
 - Suppliers of Helmets
 - Testing Interests (Australia)
 - United Firefighters Union of Australia
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-

Standards Australia wishes to acknowledge the participation of the expert individuals that contributed to the development of this Standard through their representation on the Committee and through the public comment period.

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Protective clothing for firefighters— Requirements and test methods for protective clothing used for structural firefighting

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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee SF-049, Firefighters Personal Protective Equipment to supersede AS 4967(Int)—2002. After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian Standard rather than an Australian/New Zealand Standard.

This Standard incorporates Amendment No. 1 (August 2007). The changes required by the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.

Changes to this edition include:

- (a) Replacement of references to EN 366 with ISO 6942.
- (b) Replacement of references to EN 367 with ISO 9151.
- (c) Update of requirements for penetration by liquids, including addition of o-xylene and replacement of the test method of EN 368 with that of AS/NZS ISO 6530.

This Standard is based on ISO 11613, *Protective clothing for firefighters—Laboratory test methods and performance requirements*, but has been extensively re-written to suit Australian conditions.

The Committee is committed to the development of a standard with a single level of protection that ensures a minimum safety level. It is envisaged that this would be achieved at the next revision and will form the basis of Australia's response to ISO DIS 11613.

In the longer term, the Committee is committed to developing a single standard for all items of personal protective equipment used for structural firefighting.

AS/NZS 4360, *Risk management* should be referred to when references to risk assessments are made.

The term 'normative' has been used in this Standard to define the application of the Appendix to which it applies. A 'normative' appendix is an integral part of this Standard.

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FOREWORD

Whilst the command and control procedures employed, the tactics used and the duties and responsibilities of firefighters may vary from one jurisdiction to another, in general terms the objectives of a firefighter on reaching an incident can be summarized as follows:

- (a) The saving of life and provision of humanitarian services.
- (b) The prevention or minimization of damage to property.
- (c) The prevention or minimization of damage to the environment.

The function of personal protective equipment (PPE) is to protect the firefighter whilst enabling the firefighter to achieve these objectives. In addition, in emergency situations where it is impossible to achieve the objectives, the PPE should safeguard the firefighter, allowing him or her to escape safely to a place of safety. The purpose of this Standard is to provide levels of performance requirements for firefighters' protective clothing that enable the above-mentioned criteria to be met, with the levels selected being based on the results of a risk assessment.

Employers have a responsibility to carry out a risk assessment before deciding on the type of PPE that is most suitable to protect the personnel under their control in their 'work place'. The duties and responsibilities of firefighters should be taken into account when assessing the risk and the appropriate PPE selected using the Standards required. In this way, operational procedures and different concepts of safety will both play a part in leading to the levels of performance chosen. It must be remembered that risk assessments are a starting point for action, not an objective in themselves.

Additional PPE to protect the head, face, hands and feet of firefighters should also be worn along with appropriate respiratory protection, where necessary. Currently, the relevant Standards for this PPE are as follows: head – AS/NZS 4067, hands – AS/NZS 2161, feet – AS/NZS 4821 and respiratory protection – AS/NZS 1716.

The specified controlled laboratory tests used to determine compliance with the performance requirements of this Standard do not replicate the situations to which firefighting personnel may be, exposed. During an incident, hazards other than those against which clothing to this Standard is intended to protect may be encountered e.g. chemical, biological, radiation or electrical. If the risk assessment identifies that exposure to such hazards is likely, protection by more appropriate PPE may be required either instead of or in addition to the protective clothing covered by this Standard.

It is essential that firefighters are trained in the use, care and maintenance of all PPE. This training should include an understanding of its limitations and of the necessity to remove PPE as soon as practical after an incident, mainly for physiological reasons.

Contamination or degradation of protective clothing will effect its performance. Protective clothing should be cleaned frequently following the manufacturer's recommended instructions. All repairs or alterations to the clothing should only be carried out by qualified personnel in accordance with the manufacturer's instructions.

Nothing in this Standard is intended to restrict any jurisdiction, purchaser or manufacturer from exceeding these minimum requirements.

STANDARDS AUSTRALIA

Australian Standard

Protective clothing for firefighters—Requirements and test methods for protective clothing used for structural firefighting

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies the minimum requirements and test methods for assessing protective clothing that is intended to be worn during structural firefighting and associated activities where there is a risk of heat and/or flame.

1.2 OBJECTIVE

The objective of this Standard is to provide manufacturers and suppliers with a clear statement of the minimum requirements for structural firefighters' apparel.

1.3 APPLICATION

This Standard covers the general clothing design, the minimum performance levels of the materials used, and the methods of test for determining these performance levels.

This Standard does not cover special clothing for use in other high risk situations such as specialized firefighting, or clothing for use in long term firefighting operations in high ambient temperature, e.g. brush, wildland, or forest firefighting. It does not address protection for the head, hands and feet or protection against other hazards, e.g. chemical, biological, radiation and electrical hazards. These aspects may be dealt with in other Standards.

1.4 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS/NZS

- | | |
|--------|---|
| 1906 | Retroreflective materials and devices for road traffic control purposes |
| 1906.1 | Part 1: Retroreflective materials |
| 1957 | Textiles—Care labelling |
| 4360 | Risk management |
| 4804 | Occupational health and safety management systems—General guidelines on principles, systems and supporting techniques |

AS/NZS ISO

- | | |
|------|---|
| 6530 | Protective clothing—Protection against liquid chemicals—Test method for resistance of materials to penetration by liquids |
|------|---|

ISO

- | | |
|------|---|
| 3146 | Plastics—Determination of melting behaviour (melting temperature or melting range) of semi-crystalline polymers by capillary tube and polarizing-microscope methods |
|------|---|

ISO	
3175	Textiles—Professional care, drycleaning and wet cleaning of fabrics and garments
3175-1	Part 1: Assessment of performance after cleaning and finishing
4674	Rubber- or plastics-coated fabrics—Determination of tear resistance
4674-1	Part 1: Constant rate of tear methods
4920	Textiles—Determination of resistance to surface wetting (spray test) of fabrics
5077	Textiles—Determination of dimensional change in washing and drying
6330	Textiles—Domestic washing and drying procedures for textile testing
6530	Protective clothing—Protection against liquid chemicals—Test method for AS/NZS ISO 6530 resistance of materials to penetration of liquids
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
9151	Protective clothing against heat and flame—Determination of heat transmission on exposure to flame
11092	Textiles—Physiological effects—Measurement of thermal and water-vapor resistance under steady-state conditions (sweating guarded-hotplate method)
12947	Textiles—Determination of the abrasion resistance of fabrics by the Martindale method
12947-2	Part 2: Determination of specimen breakdown
DIS 13506-3	Protective clothing against heat and flame—Test method for complete garments—Prediction of burn injury using an instrumented manikin
13688	Protective clothing—General requirements
13934	Textiles—Tensile properties of fabrics
13934-1	Part 1: Determination of maximum force and elongation at maximum force using the strip method
13935	Textiles—Seam tensile properties of fabrics and made-up textile articles
13935-1	Part 1: Determination of maximum force to rupture using the strip method
15025	Protective clothing—Protection against heat and flame—Method of test for limited flame spread
17493	Clothing and equipment for protection against heat—Test method for convective heat resistance using a hot air circulating oven
EN	
340	Protective clothing—General requirements
20811	Textiles—Determination of resistance to water penetration—Hydrostatic pressure test (ISO 811)

1.5 DEFINITIONS

For the purpose of this Standard, the definitions below apply.

1.5.1 Cargo pockets

Pockets located on the protective garment exterior.

1.5.2 Char

The formation of a brittle residue when material is exposed to thermal energy.

1.5.3 Collar lining

That part of the collar fabric composite that is next to the skin when the collar is closed in the raised position.

1.5.4 Cleaning cycle

One complete washing cycle and drying cycle in accordance with ISO 6330.

1.5.5 Composite

The layer or layers that provide protection required of outer shell, moisture barrier, and thermal barrier.

1.5.6 Closure system

A method of fastening openings in the garment including combinations of more than one method of achieving a secure closure, e.g. a slide fastener covered by an overlap fastened down with a touch and close fastener.

NOTE: This term does not cover seams.

1.5.7 Component assembly

The material combination found in a multi-layer garment arranged in the order of the finished garment construction and including any inner liner.

1.5.8 Drip

To run or fall in drops.

1.5.9 Firefighters' protective clothing

Specific garments providing protection for the firefighter's upper and lower torso, neck, arms, and legs, but excluding the head, hands, and feet.

1.5.10 Garment

A single item of clothing which may consist of single or multiple layers.

1.5.11 Hardware

Non-fabric components of protective clothing including those made of metal or plastic material, e.g. fasteners, rank markings, buttons.

1.5.12 Innermost lining

The lining found on the innermost face of a component assembly.

1.5.13 Interface area

An area of the body not protected by a protective garment, helmet, gloves, footwear, or self-contained breathing apparatus (SCBA) facepiece; the area where the protective garments and the helmet, gloves, footwear, or SCBA facepiece meet, i.e. the protective coat/helmet/SCBA facepiece area, the protective coat/glove area, and the protective trouser/footwear area.

1.5.14 Interface component

Item or items designed to provide limited protection to interface areas.

1.5.15 Interlining

A layer found between the outermost layer and the innermost lining in a multi-layer garment, but not next to the wearer's skin.