

Australian/New Zealand Standard™

High visibility safety garments

Part 1: Garments for high risk applications



AS/NZS 4602.1:2011

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Australian Chamber of Commerce and Industry
Australian Industry Group
Australia Post
AWTA Textile Testing
Certification Interests (Australia)
Council of Textile and Fashion Industries of Australia
CSIRO Textile and Fibre Technology
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High visibility safety garments

Part 1: Garments for high risk applications

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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Subcommittee SF-004-03, Light Reflective Protective Clothing, for Committee SF-004, Occupational Protective Clothing, and supersedes AS/NZS 4602:1999, *High visibility safety garments*.

This Standard incorporates Amendment No. 1 (November 2016). 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.

EN 471, *High-visibility warning clothing for professional use—Test methods and requirements*, was consulted in the preparation of this Standard.

The principal change from the previous edition is the more rigorous specification of the amount of background material required on a garment for daytime visibility in high risk applications, and the way it is to be measured.

Provision is also made for separate standards for firefighters' garments and garments for general application in situations of lower risk to be developed.

Statements expressed in mandatory terms in notes to figures are deemed to be requirements of this Standard.

The term 'informative' has been used in this Standard to define the application of the appendix to which it applies. An 'informative' appendix is only for information and guidance.

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FOREWORD

This Standard specifies high visibility safety garment requirements for use in high risk applications without reference to particular types or styles. This has been done so as to give the designer as much flexibility as possible in selecting a suitable garment design to meet differing needs as regards weather conditions, type of work and the like, and to be innovative in devising means of encouraging users to wear the garments properly. Different requirements apply to garments for fire services, which are dealt with in AS/NZS 4602.2*.

The design of garments has been based primarily on the needs of workers in road and rail traffic situations to be seen in field situations by the operators of vehicles approaching them at speed, in time for any necessary safety action to be taken. Their use is, however, recommended in all industrial situations of similar risk level where workers need to be seen at distance, against a complex visual background, in conditions of poor visibility or where they may appear suddenly in the path of a vehicle or item of moving plant.

It is important that, in order to gain the most effective use from high visibility garments, users have some understanding of the way fluorescent and retroreflective materials achieve high visibility. These mechanisms are explained as follows:

- (a) *Fluorescent material*—is impregnated with a substance that may be a dye or pigment and has the property of converting energy at shorter wavelengths (including ultraviolet) to light in the visible spectrum, hence noticeably increasing the amount of visible light and colour reflected and emitted from its surface. It will therefore work best where this is an appreciable amount of shorter wavelengths (most notably, in this context, daylight and sunlight) falling on the material. Artificial night-time light sources (with the exception of xenon arc headlights) contain little UV radiation. Two important points to note are firstly that fluorescent materials are susceptible to fairly rapid fading. Secondly, the fluorescent substances can usually only be applied to man-made fibres. Garments made from some man-made fibres may not be as comfortable to wear under hot humid conditions as natural fibres except where the man-made fibre materials have been designed to encourage air circulation without reducing their luminance factor.
- (b) *Retroreflective materials*—as the name suggests, cause practically all of the light reflected from their surface to be directed back along the path of the incoming light beam. An observer will not gain the benefit of a retroreflective article unless he/she is observing it from a position closely aligned with, usually just behind, the light source, e.g. a motor vehicle driver sitting almost directly behind the vehicle headlights.

* Yet to be prepared at time of publication of this Standard.

STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard
High visibility safety garments**Part 1: Garments for high risk applications****1 SCOPE**

This Standard specifies the visual requirements for high visibility safety garments for occupational wear by people who may be exposed to the hazard of moving traffic, moving plant or equipment in high risk situations. The Standard covers garments suitable for daytime wear, night-time wear where they will be seen by retroreflected light or for wear under both conditions but excludes garments for use by fire services.

NOTES:

- 1 This Standard covers only the visual requirements of garments. It does not cover their physical integrity or fitness for use in adverse physical environments.
- 2 Requirements for firefighters' garments are specified in AS/NZS 4602.2.
- 3 A Standard for garments to be used in lower risk applications was under consideration at the time of publication of this Standard.

2 OBJECTIVE

The objective of this Standard is to provide both manufacturers of garments and persons responsible for workers in the relevant high risk situations, with minimum requirements for high visibility safety garments.

3 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS/NZS

- 1906 Retroreflective materials and devices for road traffic control purposes
- 1906.4 Part 4: High visibility materials for safety garments
- 1957 Textiles—Care labelling
- 4399 Sun protective clothing—Evaluation and classification

4 DEFINITIONS

For the purpose of this Standard, the definitions in AS/NZS 1906.4 and the following apply.

4.1 Background material

Material providing high daytime visibility on either a daytime-only garment or a garment designed for use both day and night.

4.2 Garment reference points**(a) Elbow reference point**

A point on the sleeve of a garment as measured not more than 400 mm below the highest shoulder point to the side seam.

- A1 (b) *Underarm point*
- The underarm point is located at the junction of the armhole and the side of the body at the underarm. Where there is a Magyar or batwing design the junction point is measured 300 mm vertically below the highest shoulder point to the side seam.
- (c) *Waist level*
- For the purpose of measurement, for garments 530 ±20 mm from the high point of the shoulder.
- The waist level needs to be longer for garments designed to be worn over clothing or worn as outer clothing.
- (d) *Sizing*
- Evaluation to this Standard is conducted on a garment intended to fit a 100–105 cm body chest measurement. All other sizes in the range shall be graded according to this garment.

4.3 Upper torso

- A1 That part of the wearer's body between high point of the shoulder and waist level, and exclusive of the arms.
- NOTE: Measurement of the area of a garment covering the upper torso is specified in Clause 6.4.

5 CLASSIFICATION OF GARMENTS

The garments specified in this Standard are classified as follows:

- (a) Class D—A garment designed for daytime use.
- (b) Class N—A garment designed for night use using retroreflected light.
- (c) Class D/N—A garment designed for day and night use.

6 CLASS D GARMENTS

6.1 General

- A1 Garment compliance shall be measured on a finished garment intended to fit a body chest measurement of 100–105 cm. This design shall remain consistent throughout the garment size range, grading increasing or decreasing proportionately with the design integrity.

NOTES:

- 1 Users should take care that these garments are not mistakenly worn at night in situations that put the wearer at risk. Daytime high visibility materials are generally not effective when viewed under artificial light.
- 2 For selection and use information see Appendix C, Paragraph C3.1.
- 3 Class D garments are intended to provide the wearer with high visibility under daylight viewing conditions.

6.2 Fluorescent background material

Except as permitted in Clause 6.3 garments shall be made from background material meeting the requirements of AS/NZS 1906.4 for Class F or a combination of Class F and Class RF material.

NOTE: An optional subdivision of the colour orange-red into orange and red is shown in AS/NZS 1906.4 for the benefit of industries that require the distinction for colour coding purposes. Purchasers who require such distinction are advised to ensure by visual inspection that garment colours meet their requirements.

6.3 Non-fluorescent background materials

A1 Where specific, additional safety requirements in a particular industry require a garment to be made from a background material not capable of accepting fluorescent dyestuff to meet the requirements of Clause 6.2, other materials may be used in lieu.

Such other materials shall meet the requirements of AS/NZS 1906.4, Tables 2.1 and 2.3, and Clause 2.5.

NOTES:

- 1 Clause 2.4 of AS/NZS 1906.4 [Class NF (non-fluorescent colour)] applies to materials where for safety reasons a garment is made from a natural fibre. It is the intention of this Standard to not limit the use of other fibres that may have other safety benefits, e.g. metabolic heat-loss, and protection from heat and flame. It is not the intention of this Standard to allow the use of fibres that may be dyed with a fluorescent dyestuff but have not had the process applied.
- 2 Users of such garments should be warned that Class NF materials do not have the high daytime visibility properties of fluorescent (Class F) materials and therefore will provide reduced conspicuity for the wearer.

Materials capable of accepting fluorescent dyestuffs shall meet the requirements of Clause 6.2 and shall not be assessed against Clause 6.3.

6.4 Design of garments

6.4.1 General description

A1 A Class D garment shall comprise a garment or combination of garments of any desired type or style which, as a minimum, encircles the upper torso. High visibility background material as specified in Clause 6.2 or Clause 6.3 shall extend continuously downwards from the top of the torso and for the entire circumference of the torso, permitted openings and gussets excepted, until at least the minimum specified area of material is provided on both the front and the back of the garment.

This requirement disallows the use of side panels of non-conforming background material other than permitted underarm gussets within the measurable area.

Contrasting thread is allowable for functional or structural seam purposes.

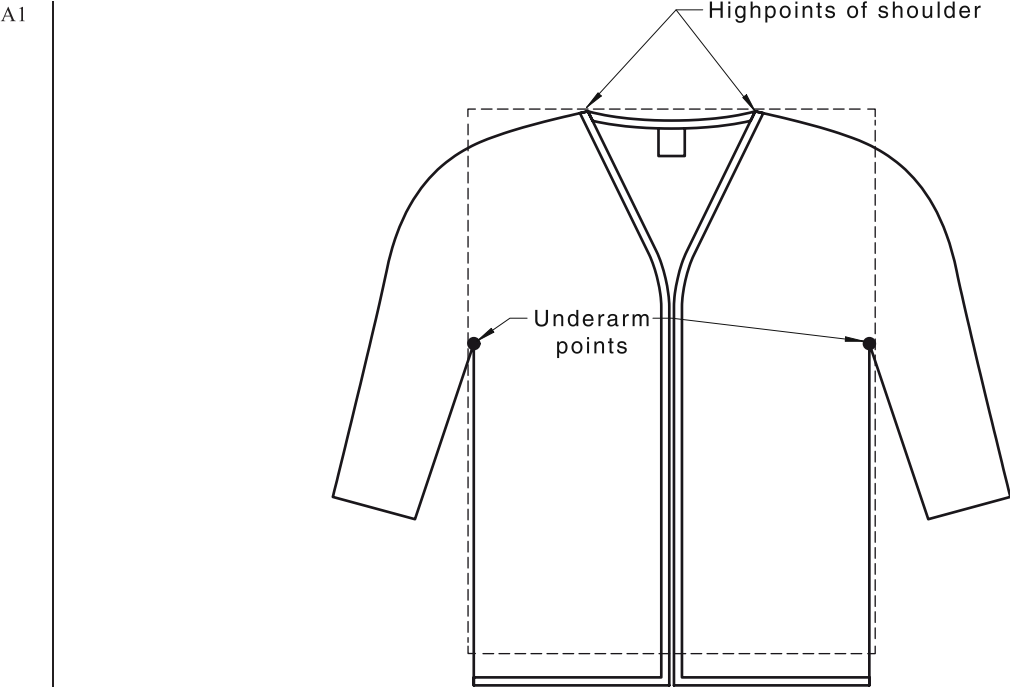
6.4.2 Area of background material

A1 The measurable area of background material covering the upper torso on each of the front and back of a garment shall be determined as follows:

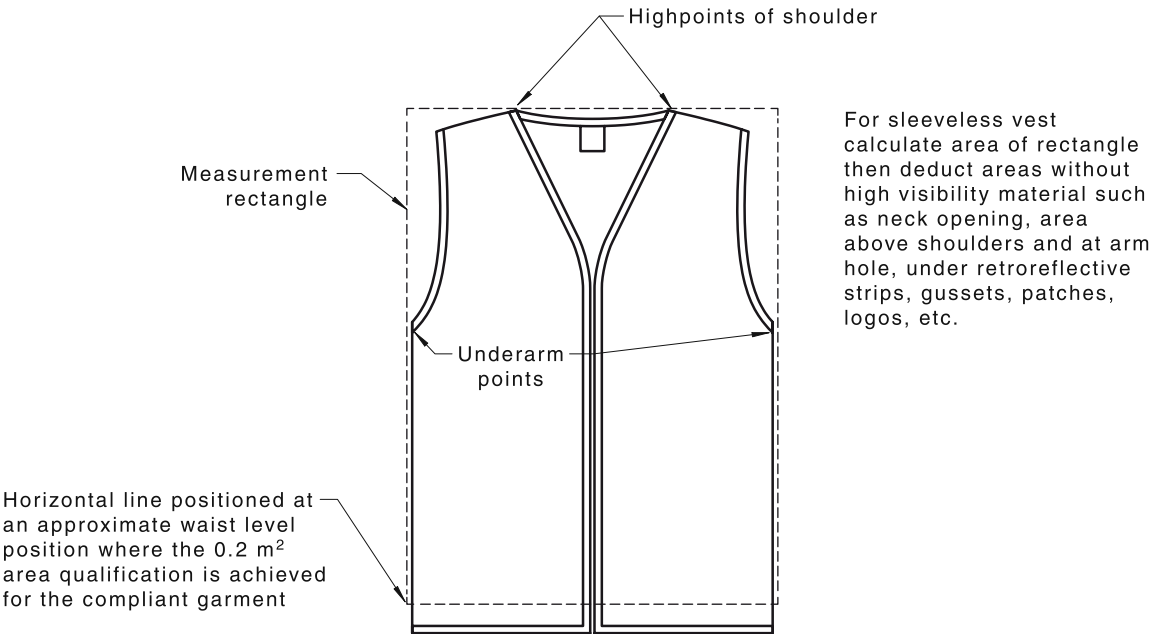
- (a) With the garment laid flat and not stretched in any direction, the area of all high visibility material covering the upper torso shall be that lying entirely within a rectangle bounded by a horizontal line through the high points of the shoulders, vertical lines through the two underarm points and a horizontal line at waist level, as shown in Figure 1(a) and 1(b).
- (b) The following shall be deducted from the total area of the upper torso material in Item (a):
 - (i) Any area below a discontinuity in the full width coverage of background material other than words, logos, pockets, permitted openings or retroreflective tapes.
 - (ii) Area covered by retroreflective tapes not meeting Class RF, AS/NZS 1906.4.
 - (iii) The area of words, logos, pockets, or underarm ventilation gussets that does not qualify as background material.
 - (iv) The area of any permitted openings.
 - (v) A collar or any area covered by a collar.

A1 | The area of background material determined as above shall be not less than 0.2 m² on each of the front and the back of the garment.

The background material is measured in accordance with Appendix A.



(a) Garment with sleeves



(b) Sleeveless garment

FIGURE 1 UPPER TORSO AREA MEASUREMENT