



# SLOVENSKI STANDARD

## SIST EN 1150:1999

01-julij-1999

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### Varovalna obleka – Vidna obleka za nepoklicno uporabo – Preskusne metode in zahteve

Protective clothing - Visibility clothing for non-professional use - Test methods and requirements

Schutzkleidung - Warnkleidung für den nicht professionellen Gebrauch - Prüfverfahren und Anforderungen

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Vêtements de protection - Vêtements de visualisation à utilisation non professionnelle - Méthodes d'essai et exigences

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**Ta slovenski standard je istoveten z: EN 1150:1999**

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#### **ICS:**

13.340.10      Varovalna obleka      Protective clothing

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Descriptors: personal protective equipment, accident prevention, garments, protective clothing, signalling, visibility, design, reflecting materials, characteristics, colour, colourfastness, physical properties, photometric properties, tests, maintenance, labelling, marking, graphic symbols

English version

## Protective clothing - Visibility clothing for non-professional use - Test methods and requirements

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Anforderungen

This European Standard was approved by CEN on 20 December 1998.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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## Foreword

This European Standard has been prepared by Technical Committee CEN/TC 162 "Protective clothing including hand and arm protection and lifejackets" , the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 1999, and conflicting national standards shall be withdrawn at the latest by July 1999.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this standard.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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## Introduction

This European Standard provides details on the performance of high visibility warning clothing for non-professional use together with minimum areas and placement of material to achieve enhanced conspicuity against most background conditions found in urban and rural situations both day and night.

The area of material is dependant on the size of the wearer and conspicuity is enhanced by high contrast between the garment and the ambient background.

This Standard is not intended to comply with the requirements of clothing used by professionals, attention should be drawn to EN 471 "High-visibility warning clothing", which specifies characteristics and properties for high-visibility warning clothing intended for the work-area, that is for professional use.

A European Standard for requirements and test methods for high-visibility accessories for non-professional use is under preparation.

## 1 Scope

This Standard specifies the optical performance requirements for high-visibility clothing to be worn by adults and by juveniles, and designed for non-professional use. High-visibility clothing for non-professional use is intended to signal the user's presence visually in any daylight condition and, when illuminated by vehicle headlights or search lights in the dark as well as lit up in urban roads.

This standard is not applicable to accessories to be carried by persons or attached to garments.

## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 340

Protective clothing - General requirements

EN 471 : 1994

High-visibility warning clothing

EN 530 : 1994

Abrasion resistance of protective clothing material - Test methods

EN 20105-B02

Textiles - Tests for colour fastness - Part B02: Colourfastness to artificial light (Xenon arc fading lamp test) (ISO 105-B02:1988)

EN 23758

Textiles - Care labelling code using symbols (ISO 3758:1991)

<https://standards.iteh.ai/catalog/standards/sist/1af6c62c-81d4-48c0-914f-1105887023d9/sist-en-1150-1999>

EN ISO 105-C06 : 1997

Textiles - Tests for colour fastness - Part C06: Colour fastness to domestic and commercial laundering (ISO 105-C06:1994)

EN ISO 105-D01

Textiles - Tests for colour fastness - Part D01: Colour fastness to dry cleaning (ISO 105-D01:1993)

EN ISO 105-X11

Textiles - Tests for colour fastness - Part X11: Colour fastness to hot pressing (ISO 105-X11:1994)

EN ISO 3175 : 1995

Textiles - Evaluation of stability to machine dry-cleaning (ISO 3175:1995)

prEN ISO 6330 : 1997

Textiles - Domestic washing and drying procedures for textile testing (ISO/DIS 6330:1997)

ISO 4675

Rubber - or plastics-coated fabrics - Low - temperature bend test

ISO 7854 : 1995

Rubbers - or plastics-coated fabrics - Determination of resistance to damage by flexing

CIE 15.2 : 1986

Colorimetry

CIE 17.4 : 1987

International lighting vocabulary

CIE 54 : 1982

Retroreflection - Definition and measurement

### 3 Definitions

For the purposes of this standard the definitions for photometric terms according to CIE 17.4 : 1987 and CIE 54 : 1982 and the following definitions apply.

#### 3.1 high-visibility garment

high-visibility garment, worn on the body, arms and the legs, intended to provide conspicuity at all times.

NOTE: Coats, jackets, suits and waistcoats are typically examples for high-visibility garment.

#### 3.2 fluorescent material

material that absorbs optical radiation at shorter wavelengths and emits optical radiation at longer wavelengths.

#### 3.3 background material

coloured fluorescent material intended to be highly conspicuous, but not intended to comply with the requirements of this standard for retroreflective material.

#### 3.4 retroreflective material

material from which the reflected rays are preferentially returned in direction close to the opposite of the direction of the incident rays.

#### 3.5 separate-performance material

material intended to be used as either background or retroreflective material.

#### 3.6 combined-performance material

material intended to exhibit both background and retroreflective properties.

#### 3.7 orientation sensitive material

material having coefficients of retroreflection that differ by more than 15 % when measured at the two rotation angles  $\varepsilon_1 = 0^\circ$  and  $\varepsilon_2 = 90^\circ$ .

## 4 Design

### 4.1 General

Garments shall comprise the required areas of background materials and retroreflective materials or alternatively shall comprise the required area of combined performance material as given in table 1. In the latter case the area of background material can be reduced by the applied area of combined performance material.

**Table 1 - Minimum areas of exposed material**

Height h cm	Area of background material m <sup>2</sup>	Area of retroreflective material m <sup>2</sup>	Area of combined performance material m <sup>2</sup>
$h \leq 104$	0,14	0,06	0,09
$h \leq 121$	0,18	0,07	0,11
$h \leq 140$	0,24	0,08	0,12
$h \leq 158$	0,32	0,09	0,13
$h \leq 176$	0,36	0,09	0,14
$h > 176$	0,40	0,10	0,15

### 4.2 High-visibility clothing manufactured incorporating separate and combined performance material

#### 4.2.1 Background material

The total area of background material may comprise smaller areas of various colours as defined in table 2.

The material shall be evenly distributed around the body and shall be applied so that the minimum width is not less than 50 mm. Any gap for fastening in the continuity shall not be greater than 50 mm. The total of such gaps shall not be greater than 100 mm in any one band.

NOTE: Maximum 360° visibility is achieved by applying the background material as a coherent area evenly distributed around the body at chest height.

#### 4.2.2 Retroreflective material

The retroreflective material shall be evenly distributed to all aspects of the body covered by the background material.

Retroreflective material may be applied in band, logo or other shape form. The individual minimum area of retroreflective material shall be not less than 25 cm<sup>2</sup> and the minimum width shall be not less than 25 mm. If the garment has sleeves retroreflective material shall be applied to the outer side of or around the arm corresponding to the amount of a 25 mm material band. [SIST EN 1150:1999](https://standards.iteh.ai/catalog/standards/sist/1af6c62c-81d4-48c0-914f)

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The material shall be evenly distributed to all aspects of the body covered by background material.

#### 4.2.3 Combined performance material

The material shall comply with the requirements of 4.2.1 or 4.2.2 according to the intended use.

## 5 Requirements for background material and combined performance material

### 5.1 General requirements

All requirements specified in EN 340 shall be fulfilled.



NOTE: The small sizes are not specifically included in EN 340.

## 5.2 Colour

### 5.2.1 Colour of new background and combined performance material

The colour and the luminance factor of new background and combined-performance material shall be within the regions given in table 2 when tested in accordance with 7.2.

**Table 2 - Colour coordinates for background material and combined performance material**

Colour	Chromaticity coordinates		Minimum luminance factor $\beta_{min}$	
	x	y	Background material	Combined performance material
fluorescent green	0,026	0,399	0,40	0,33
	0,170	0,364		
	0,285	0,441		
	0,201	0,776		
fluorescent yellow-green	0,201	0,776	0,50	0,40
	0,285	0,441		
	0,356	0,494		
	0,387	0,610		
fluorescent yellow	0,387	0,610	0,76	0,70
	0,356	0,494		
	0,398	0,452		
	0,460	0,540		
fluorescent yellow-orange	0,460	0,540	0,60	0,50
	0,427	0,493		
	0,494	0,426		
	0,545	0,454		
fluorescent orange	0,545	0,454	0,50	0,40
	0,494	0,426		
	0,544	0,376		
	0,610	0,390		
fluorescent orange-red	0,610	0,390	0,40	0,40
	0,544	0,376		
	0,579	0,341		
	0,655	0,345		
fluorescent red	0,655	0,345	0,25	0,25
	0,579	0,341		
	0,606	0,314		
	0,690	0,310		
fluorescent pink	0,655	0,345	0,40	0,30
	0,435	0,335		
	0,372	0,272		
	0,495	0,155		

### 5.2.2 Colour for background and combined performance material after xenon test

The colour after exposure shall be within the areas defined by coordinates given in the relevant table 2. The luminance factor shall be not less than the values given in table 2. The light fastness of the test sample shall be