РЕПУБЛИКА СРБИЈА

Republic of Serbia

EDICT OF GOVERNMENT

In order to promote public education and public safety, equal justice for all, a better informed citizenry, the rule of law, world trade and world peace, this legal document is hereby made available on a noncommercial basis, as it is the right of all humans to know and speak the laws that govern them.

SRPS EN 170 (2008) (English): Personal eye-protection - Ultraviolet filters - Transmittance requirements and recommended use [Authority: The European Union Per Directive 89/686/EEC]

BLANK PAGE

SRPSKI
STANDARD

SRPS EN 170

Februar 2008.

Identičan sa EN 170:2002

Lična zaštita očiju — Filtri za ultraljubičasto zračenje — Zahtevi u pogledu koeficijenta i preporučena upotreba

Personal eye-protection — Ultraviolet filters — Transmittance requirements and recommended use

I izdanje

INSTITUT ZA STANDARDIZACIJU SRBIJE

Referentna oznaka
SRPS EN 170:2008 (en)

AUTORSKA PRAVA ZAŠTIĆENA

Izdaje Institut za standardizaciju Srbije

INSTITUT ZA STANDARDIZACIJU SRBIJE
11030 Beograd, Stevana Brakusa 2, p.f. 2105

Telefoni: (011) 35-41-260, 35-41-261
Telefaks: (011) 35-41-257
Prodaja: (011) 25-47-496
Informacioni centar: (011) 25-47-293

jus1@jus.org.yu
prodaja@jus.org.yu

www.jus.org.yu

Ovaj standard doneo je direktor Instituta za standardizaciju Srbije rešenjem br. 1218/5-52-01/2008 od 27. februara 2008. godine.

Saopštenje o proglašavanju

Evropski standard EN 170:2002, *Personal eye-protection — Ultraviolet filters — Transmittance requirements and recommended use* prihvata se, bez ikakvih modifikacija, kao srpski standard SRPS EN 170 na engleskom jeziku. Evropski standard može se nabaviti u Institutu za standardizaciju Srbije.

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 170

October 2002

ICS 13.340.20

Supersedes EN 170:1992

English version

Personal eye-protection - Ultraviolet filters - Transmittance requirements and recommended use

Protection individuelle de l'oeil - Filtres pour l'ultraviolet - Exigences relatives au facteur de transmission et utilisation recommandée

Persönlicher Augenschutz - Ultraviolettschutzfilter - Transmissionsanforderungen und empfohlene Anwendung

This European Standard was approved by CEN on 12 September 2002.

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 Management Centre 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 Management Centre 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, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 170:2002 E

Contents

Foreword

This document (EN 170:2002) has been prepared by Technical Committee CEN /TC 85, "Eye-protective equipment", the secretariat of which is held by AFNOR.

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 April 2003, and conflicting national standards shall be withdrawn at the latest by April 2003.

This document supersedes EN 170:1992.

This document 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 document.

In this European Standard, Annex A is normative and Annexes B and C are informative.

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, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies the scale numbers and transmittance requirements for filters for protection against ultraviolet radiation.

The other applicable requirements for these types of filters and the frames/mountings to which they are intended to be fitted are given in EN 166.

Guidance on the selection and use of these filters are given in annex B.

NOTE The protective filters specified in this standard are not suitable for the direct viewing of bright light sources like Xenon high-pressure arc lamps or for the direct or indirect observation of an electric welding arc. For this purpose a welding filter as specified in EN 169 and with a scale number appropriate to the source being observed should by used.

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 (including amendments).

EN 165:1995, *Personal eye-protection – Vocabulary.*

EN 166, *Personal eye-protection – Specifications.*

EN 167, *Personal eye-protection – Optical test methods.*

ISO/CIE 10526:1999, *CIE Standard illuminants for colorimetry.*

ISO/CIE 10527:1991, *CIE Standard colorimetric observers.*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 165:1995 apply.

4 Designation and identification

The complete table of numbering of filters is given in EN 166.

The marking of oculars and frame is described in EN 166.

The scale number of ultraviolet filters comprises the code number 2 and the shade number corresponding to the filter, from 1,2 to 5 (see Table 1).

5 Requirements

5.1 General

The requirements of EN 166 apply to ultraviolet filters. Only those requirements that are different from or supplement the EN 166 specifications are given in this European standard.

5.2 Transmittance requirements

The definitions of transmittances are given in EN 165.

The determination of luminous transmittance is described in EN 167.

The transmittance requirements for filters used for protection against ultraviolet radiation are given in Table 1.

Table 1 – Transmittance requirements

Scale number	Maximum spectral transmittance in the ultraviolet $\tau(\lambda)$		Luminous transmittance τ_v		Transmittance in the infrared spectral range
	313 nm %	365 nm %	maximum %	minimum %	
2-1,2	0,0003	10	100	74,4	no specification
2-1,4	0,0003	9	74,4	58,1	
2-1,7	0,0003	7	58,1	43,2	
2-2	0,0003	5	43,2	29,1	
2-2,5	0,0003	3	29,1	17,8	
2-3	0,0003	2	17,8	8,5	
2-4	0,0003	0,8	8,5	3,2	
2-5	0,0003	0,3	3,2	1,2	

Minimum and maximum values of luminous transmittance may be exceeded by taking into account the limits of relative uncertainty given in EN 167.

Additional requirements:

a) for 210 nm $\leq \lambda \leq$ 313 nm the spectral transmittance shall not exceed the value specified for 313 nm;

b) for 313 nm $< \lambda \leq$ 365 nm the spectral transmittance shall not exceed the value specified for 365 nm;

c) for 365 nm $< \lambda \leq$ 405 nm the spectral transmittance shall not exceed the luminous transmittance;

NOTE Luminous transmittance values are based on the spectral distribution of CIE illuminant A and on the CIE (1931) standard observer (2°) (see ISO/CIE 10526:1999 and ISO/CIE 10527:1991).

5.3 Ocular with enhanced colour recognition (optional)

Between 500 nm and 650 nm the spectral transmittance shall be not less than 0,2 τ_v.

The relative visual attenuation quotient Q, for signal lights red, yellow, green and blue shall be not less than 0,8.

Annex A
(normative)

Relative visual attenuation quotient for signal light recognition

A.1 Definition of relative visual attenuation quotient for signal light recognition

This quotient Q is defined as:

$$Q = \frac{\tau_{sign}}{\tau_v}$$

where

τ_v is the luminous transmittance of the filter for CIE standard illuminant D 65. See ISO/CIE 10526:1999

τ_{sign} is the luminous transmittance of the filter for the spectral power distribution of the traffic signal light.

These are given by the equations:

$$\tau_v = \frac{\int_{380\ nm}^{780\ nm} \tau_F(\lambda) \cdot V(\lambda) \cdot S_{D65\lambda}(\lambda) \cdot d\lambda}{\int_{380\ nm}^{780\ nm} V(\lambda) \cdot S_{D65\lambda}(\lambda) \cdot d\lambda}$$

$$\tau_{sign} = \frac{\int_{380\ nm}^{780\ nm} \tau_F(\lambda) \cdot \tau_s(\lambda) \cdot V(\lambda) \cdot S_{A\lambda}(\lambda) \cdot d\lambda}{\int_{380\ nm}^{780\ nm} \tau_s(\lambda) \cdot V(\lambda) \cdot S_{A\lambda}(\lambda) \cdot d\lambda}$$

where

$S_{A\lambda}(\lambda)$ is the spectral distribution of radiation of CIE standard illuminant *A* (or 3200 K light source for blue signal light). See: ISO/CIE 10526:1999

$S_{D65\lambda}(\lambda)$ is the spectral distribution of radiation of CIE standard illuminant D65. See ISO/CIE 10526:1999

$V(\lambda)$ is the spectral luminous efficiency for daylight vision. See ISO/CIE 10 527:1991

$\tau_S(\lambda)$ is the spectral transmittance of the traffic signal lens;

$\tau_F(\lambda)$ is the spectral transmittance of the filter.

The spectral values of the products of the spectral distributions ($S_{A\lambda}(\lambda)$, $S_{D65\lambda}(\lambda)$), of the illuminants, the spectral luminous efficiency $V(\lambda)$ of the eye and the spectral transmittance $\tau(\lambda)$ of the traffic signal lenses are given in A.2.

A.2 Spectral functions for the calculation of luminous transmittance and relative visual attenuation quotients

Table A.1 :Product of the spectral distribution of radiation of the signal lights and standard illuminant D65 as specified in ISO/CIE 10526:1999 and the spectral luminous efficiency of the average human eye for daylight vision as specified in ISO/CIE 10527:1991

Wavelength λ	$S_A(\lambda)\ V(\lambda)\ \tau_S(\lambda)$				$S_{D65}(\lambda)\ V(\lambda)$
nm	red	yellow	green	blue[a]	
380	0	0	0	0,0001	0
390	0	0	0	0,0008	0,0005
400	0	0	0,0014	0,0042	0,0031
410	0	0	0,0047	0,0194	0,0104
420	0	0	0,0171	0,0887	0,0354
430	0	0	0,0569	0,3528	0,0952
440	0	0	0,1284	0,8671	0,2283
450	0	0	0,2522	1,5961	0,4207
460	0	0	0,4852	2,6380	0,6688
470	0	0	0,9021	4,0405	0,9894
480	0	0	1,6718	5,9025	1,5245
490	0	0	2,9976	7,8862	2,1415
500	0	0	5,3553	10,1566	3,3438
510	0	0	9,0832	13,0560	5,1311
520	0	0,1817	13,0180	12,8363	7,0412
530	0	0,9515	14,9085	9,6637	8,7851
540	0	3,2794	14,7624	7,2061	9,4248
550	0	7,5187	12,4687	5,7806	9,7922
560	0	10,7342	9,4061	3,2543	9,4156
570	0	12,0536	6,3281	1,3975	8,6754
580	0,4289	12,2634	3,8967	0,8489	7,8870
590	6,6289	11,6601	2,1640	1,0155	6,3540
600	18,2382	10,5217	1,1276	1,0020	5,3740
610	20,3826	8,9654	0,6194	0,6396	4,2648
620	17,6544	7,2549	0,2965	0,3253	3,1619
630	13,2919	5,3532	0,0481	0,3358	2,0889
640	9,3843	3,7352	0	0,9695	1,3861
650	6,0698	2,4064	0	2,2454	0,8100
660	3,6464	1,4418	0	1,3599	0,4629
670	2,0058	0,7892	0	0,6308	0,2492
680	1,1149	0,4376	0	1,2166	0,1260
690	0,5590	0,2191	0	1,1493	0,0541
700	0,2902	0,1137	0	0,7120	0,0278
710	0,1533	0,0601	0	0,3918	0,0148
720	0,0742	0,0290	0	0,2055	0,0058
730	0,0386	0,0152	0	0,1049	0,0033
740	0,0232	0,0089	0	0,0516	0,0014
750	0,0077	0,0030	0	0,0254	0,0006
760	0,0045	0,0017	0	0,0129	0,0004
770	0,0022	0,0009	0	0,0065	0
780	0,0010	0,0004	0	0,0033	0
Sum	100	100	100	100	100

[a] For blue flashing light the spectral distribution for 3200 K is used instead of standard illuminant A.

Annex C
(informative)

Uncertainty of measurement and results interpretation

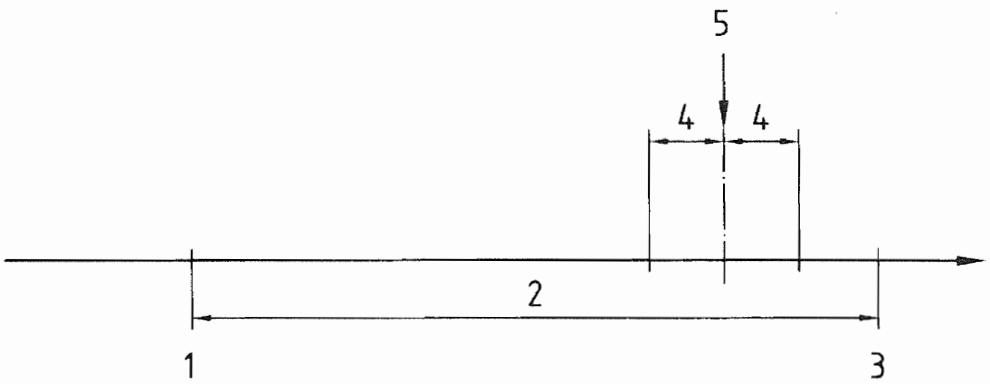
C.1 Test report and uncertainty of measurement

For each of the required measurements performed in accordance with this standard, a corresponding estimate of the uncertainty of measurement should be evaluated.

This estimate of uncertainty should be applied and stated when reporting test results, in order to enable the user of the test report to assess the reliability of the data.

The following protocol with regard to uncertainty of measurement should be applied to test results:

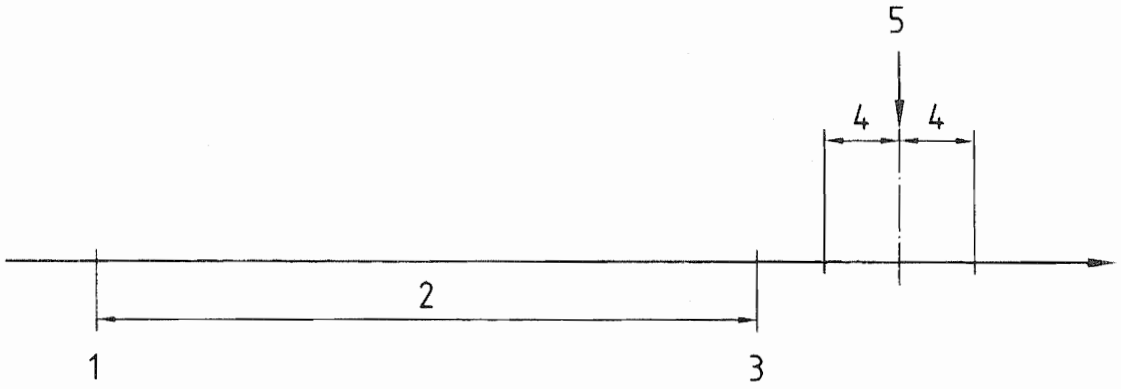
If the limit value for the particular test given in the standard, falls outside of the range of values calculated from the test data plus/minus the uncertainty U of measurement, then the result should be deemed to be a straightforward pass or fail (see Figures C.1 and C.2).



Key

1 Lower specification limit (LSL)
2 Specification zone
3 Upper specification Limit (USL)
4 U
5 Result of a measurement

Figure C.1 — Result pass

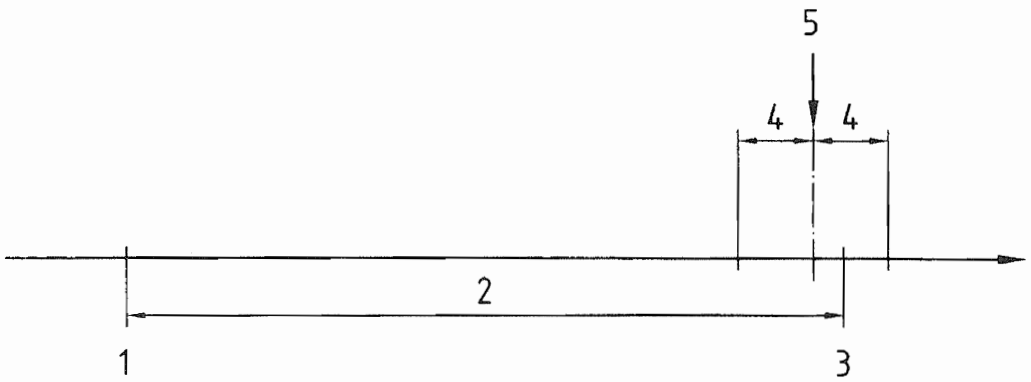


Key

1 Lower specification limit (LSL)
2 Specification zone
3 Upper specification Limit (USL)
4 *U*
5 Result of a measurement

Figure C.2 — Result fail

If the limit value for the particular test given in the standard, falls within the range of values calculated from the test data plus/minus the uncertainty *U* of measurement, then the assessment of pass or fail should be determined on the basis of safety, that is considering the safest conditions for the user of the PPE (see Figure C.3).



Key

1 Lower specification limit (LSL)
2 Specification zone
3 Upper specification Limit (USL)
4 *U*
5 Result of a measurement

Figure C.3 — Result fail

Annex ZA
(informative)

Clauses of this European Standard addressing essential requirements or other provisions of EU Directives

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 89/686/EEC.

WARNING: Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

The following clauses of this standard are likely to support requirements of Directive 89/686/EEC, Annex II :

Table ZA.1 - Relationship between this standard and Directive 89/686/EEC

Directive 89/686/EEC, Annex II		Clauses
1.1.1	Ergonomics	Scope, annex B
1.1.2.1	Highest level of protection possible	5
1.1.2.2.	Classes of protection appropriate to different levels of risk	5, annex B
1.2	Innocuousness of PPE	
1.2.1	Absence of risks and other inherent nuisance factors	Scope
1.2.1.1	Suitable constituent materials	Scope
1.2.1.2	Satisfactory surface condition of all PPE parts in contact with the user	Scope
1.2.1.3	Maximum user impediment	Scope
1.3	Comfort and efficiency	
1.3.1	Adaptation to users morphology	Not relevant
1.3.2	Lightness and design strength	Scope
1.3.3	Compatibility of different classes or types of PPE designed for simultaneous use	Not relevant
1.4	Information supplied by the manufacturer	Scope
2.3	PPE for the face, eyes and respiratory tracts	5.2
2.4	PPE subject to ageing	Scope
2.12	PPE bearing one or more identification or recognition marks directly or indirectly relating to health and safety	4
3.9.1	Non-ionising radiation	5, annex B

Compliance with the clauses of this standard provides one means of conforming to the specific essential requirements of the Directive concerned and associated EFTA regulations.

Bibliography

EN 169, *Personal eye-protection – Filters for welding and related techniques – Transmittance requirements and recommended use.*

ICS 13.340.20 **Klasifikaciona grupa Z.B1**

Deskriptori: sprečavanje nezgoda, koeficijent slabljenja, zaštita očiju, oprema za zaštitu očiju, filtri (zaštita), merna nesigurnost, nivo zaštite, koeficijent transmisije, zaštitni UV-filtar

Descriptors: accident prevention, attenuation quotient, eay-protection, eye-protective equipment, filters (protection), uncertainty of measurement, protection level, transmittance, protective UV-filter