

---

**Profili iz trdega polivinilklorida (PVC-U) za izdelavo oken in vrat - Ugotavljanje odpornosti proti vremenskim vplivom s pospešenim staranjem**

Unplasticized polyvinylchloride (PVC-U) profiles for the fabrication of windows and doors  
- Determination of the resistance to artificial weathering

Profile aus weichmacherfreiem Polyvinylchlorid (PVC-U) zur Herstellung von Fenstern und Türen - Bestimmung der Wetterechtheit und Wetterbeständigkeit durch künstliche Bewitterung

Profilés de polychlorure de vinyle non plastifié (PVC-U) pour la fabrication des fenetres et des portes - Détermination de la résistance au vieillissement artificiel

**Ta slovenski standard je istoveten z: EN 513:1999**

**ICS:**

83.140.99	Drugi izdelki iz gume in polimernih materialov	Other rubber and plastics products
91.060.50	Vrata in okna	Doors and windows

**SIST EN 513:2000****en**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 513:2000

<https://standards.iteh.ai/catalog/standards/sist/e38a23f4-5f1c-4800-8b0b-48bf58ed7203/sist-en-513-2000>

EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

EN 513

July 1999

ICS 83.080.20; 83.140.99

English version

Unplasticized polyvinylchloride (PVC-U) profiles for the  
fabrication of windows and doors - Determination of the  
resistance to artificial weathering

Profils de polychlorure de vinyle non plastifié (PVC-U)  
pour la fabrication des fenêtres et des portes -  
Détermination de la résistance au vieillissement artificiel

Profile aus weichmacherfreiem Polyvinylchlorid (PVC-U)  
zur Herstellung von Fenstern und Türen - Bestimmung der  
Wetterechtheit und Wetterbeständigkeit durch künstliche  
Bewitterung

This European Standard was approved by CEN on 7 June 1999.

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.



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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Contents	Page
<b>Foreword</b> .....	<b>3</b>
<b>1 Scope</b> .....	<b>4</b>
<b>2 Normative references</b> .....	<b>4</b>
<b>3 Principle</b> .....	<b>4</b>
<b>4 Apparatus</b> .....	<b>4</b>
4.1 Artificial weathering apparatus with a Xenon arc light source .....	4
4.2 Grey scale .....	5
4.3 Colour change measurement apparatus.....	5
4.4 Charpy impact apparatus.....	5
<b>5 Test pieces</b> .....	<b>6</b>
5.1 Number of test pieces.....	6
5.2 Dimensions of the test pieces.....	6
5.3 Preparation of the test pieces .....	6
<b>6 Conditioning</b> .....	<b>6</b>
<b>7 Weathering test conditions</b> .....	<b>7</b>
7.1 General.....	7
7.2 Test conditions for method 1 .....	7
7.3 Test conditions for method 2.....	7
<b>8 Procedure</b> .....	<b>8</b>
<b>9 Test Report</b> .....	<b>9</b>
<b>Annex A (informative) Reasons for the choice of exposure conditions</b> .....	<b>11</b>
A.1 Scope.....	11
A.2 Moderate climates.....	11
A.3 Severe (hot and dry) climates.....	11

iTech STANDARD PREVIEW

(standards.iteh.ai)

SIST EN 513:2000

[https://standards.iteh.ai/catalog/standards/sist/c38a23ff-51fc-4800-8b0b-](https://standards.iteh.ai/catalog/standards/sist/c38a23ff-51fc-4800-8b0b-48bf58ed7203/sist-en-513-2000)

48bf58ed7203/sist-en-513-2000

## Foreword

This European Standard has been prepared by Technical Committee CEN/TC 33 "Doors, windows, shutters and building hardware", 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 January 2000, and conflicting national standards shall be withdrawn at the latest by January 2000.

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.

The requirements are incorporated in the appropriate Product Standard.

This draft European Standard is based on the results of extensive research and inter-laboratory testing comparing artificial and natural weathering. From the results it was concluded that the requirements for the retention of mechanical properties after long term artificial weathering were best defined using one method, and Charpy impact strength testing was chosen. In addition, the spray cycles for moderate and severe climates have been chosen.

Annex A, which is informative, gives the reasons for the choice of exposure conditions.

This standard reflects the state of the art at the time of publication. Further research may necessitate amendments to this standard.

SIST EN 513:2000

<https://standards.iteh.ai/catalog/standards/sist/e38a23f4-5f1c-4800-8b0b-48bf58ed7203/sist-en-513-2000>

## 1 Scope

This European Standard specifies a method for exposing test pieces from an unplasticized polyvinylchloride (PVC-U) profile for the fabrication of windows and doors to a Xenon arc laboratory light source, in order to assess changes in impact strength and colour. The method given in 8.10 (b) is the reference method of colour measurement.

## 2 Normative references

This European Standard incorporates by dated or undated references, provisions from other publications listed hereafter. These normative references are cited in 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 by amendment or revision. For undated references, the latest edition of the publication referred to applies.

EN 20105-A03	Textiles - Tests for colour fastness. Part AO3 : Grey scale for assessing staining (ISO 105-A03:1993)
EN ISO 179	Plastics - Determination of Charpy impact strength (ISO 179:1993)
ISO 4892 - 1 : 1994	Plastics - Methods of exposure to laboratory light sources - Part 1 : General guidance
ISO 4892 - 2	Plastics - Methods of exposure to laboratory light sources - Part 2 : Xenon-arc sources
ISO 7724 - 1	Paints and varnishes - Colorimetry - Part 1 : Principles
ISO 7724 - 2	Paints and varnishes - Colorimetry - Part 2 : Colour measurement
ISO 7724 - 3	Paints and varnishes - Colorimetry - Part 3 : Calculation of colour differences
CIE Publication 15.2	Colorimetry

## 3 Principle

Test pieces taken from the sight surface of the profiles are exposed in a Xenon arc artificial weathering apparatus at a specified irradiance, Black and White Standard Temperatures, relative humidity and spray cycle.

After specified radiation doses, the changes in Charpy impact strength and colour of the test pieces are determined.

## 4 Apparatus

### 4.1 Artificial weathering apparatus with a Xenon arc light source

The apparatus shall comply with ISO 4892 Part 1 and 2 and with the requirements of this standard. Accordingly, each apparatus shall include the following :

**4.1.1 A Xenon arc source** in accordance with method A of ISO 4892 Part 2 with a spectral irradiance in the band pass of 280 nm to 800 nm of  $(550 \pm 55) \text{ W/m}^2$  and a spectral irradiance in the band pass of 280 nm to 400 nm of  $(60 \pm 12) \text{ W/m}^2$ .

**4.1.2 A test enclosure** which contains a frame carrying test piece holders.

- 4.1.3 Spray nozzles** to provide uniform and continuous wetting of the exposed test pieces for defined periods of time.

*NOTE : The intention of the spraying is not to scour loosely bound solid material. It is important, therefore, that the combination of droplet size and velocity is chosen to minimise the removal of solid material.*

- 4.1.4 A means of providing controlled humidity** at the defined level.
- 4.1.5 A means of controlling air temperature** within the test chamber.
- 4.1.6 A Black Standard Thermometer** in accordance with 4.1.5.1.1 of ISO 4892 Part 1: 1994 with a response time less than 1 min and a means of recording maximum temperatures during one cycle.
- 4.1.7 A White Standard Thermometer** in accordance with 4.1.5.1.1 of ISO 4892 Part 1:1994 with a response time less than 1 min and a means of recording maximum temperatures during one cycle.
- 4.1.8 A device to determine the UV radiant exposure** in the wavelength region between 280 nm and 400 nm expressed in joules per square metre ( $J/m^2$ ).
- 4.1.9 A device to determine the radiant exposure in the UV and visible** wavelength region between 280 nm and 800 nm expressed in joules per square metre ( $J/m^2$ ).

*NOTE : It is recognised that not all the above parameters can be met on all apparatuses at the present moment but these requirements apply to all apparatuses from 1 January 2000.*

## 4.2 Grey scale

for the assessment of changes in colour in accordance with EN 20105 - AO3.

*NOTE : This grey scale can be obtained from:*

British Standards Institution  
389 Chiswick High Road  
London W4 4AL

AATCC  
1 Davis Drive  
PO Box 12215  
Research Triangle Park  
North Carolina 27709  
USA

Beuth - Verlag GmbH  
Burggrafenstr. 6  
D - 10787 Berlin

## 4.3 Colour change measurement apparatus

in accordance with ISO 7724 : Parts 1 and 2 with the following features :

- 1) Employing CIE Publication 15.2 illuminant D65;
- 2) Measuring condition 8/d or d/8 including specular reflectance (*without* gloss trap for both).

## 4.4 Charpy impact apparatus

generally in accordance with EN ISO 179 but with the distance between supports equal to 40 mm. The pendulum energy shall be 1J or 2 J.

## 5 Test pieces

### 5.1 Number of test pieces

For the assessment of the change in colour, two test pieces, one of which is a reference, of dimensions specified in 5.2.1 shall be used.

For the determination of the change in Charpy impact strength, two series each of six pieces, one of which is a reference series, of dimensions as specified in 5.2.2 shall be used.

*NOTE : Due to the possibility of discarding defective test pieces (see 5.3.2), it may be advisable to increase the initial number of test pieces in the light of particular experience.*

### 5.2 Dimensions of the test pieces.

5.2.1 Test pieces for the assessment of the change in colour shall be of minimum dimensions 50 mm x 40 mm.

5.2.2 Test pieces for the determination of the change in Charpy impact strength.

The test pieces are prepared in two stages :

Stage 1 - two series each of six test pieces with a length of  $(50 \pm 1)$  mm, a width of  $(6 \pm 0,2)$  mm and a thickness equal to the wall thickness of the profile are prepared for weathering or storage.

Stage 2 - after storage or weathering, all test pieces are notched generally in accordance with EN ISO 179 designation EN ISO 179/1fA but with a residual width between the notches of  $(3 \pm 0,1)$  mm.

### 5.3 Preparation of the test pieces

5.3.1 The test pieces shall be taken from the sight surface of a profile such that the longitudinal direction of the test pieces and the profile are the same. The test pieces shall be of the dimensions specified in 5.2.1 and 5.2.2.

5.3.2 All test pieces for the determination of the change of Charpy impact strength shall be inspected for imperfections such as crazes in the machined surface. When imperfections are found, those test pieces are discarded.

## 6 Conditioning

6.1 Conditioning is not required before exposure in the artificial weathering apparatus.

6.2 Before impact testing the test pieces shall be conditioned at  $(23 \pm 2)$  °C and  $(50 \pm 5)$  % R.H. for at least 16 h.



## 7 Weathering test conditions

### 7.1 General

For the simulation of the different climates in Europe there are two different methods of exposure defined:

Method 1 for simulation of moderate climate (**M**);

Method 2 for simulation of severe (hot and dry) climate (**S**).

In annex A reasons for the choice of test conditions are given.

### 7.2 Test conditions for method 1

**7.2.1** The Black Standard Temperature (BST) shall be  $(60 \pm 3) ^\circ\text{C}$ . The air temperature in the test enclosure shall be controlled to a constant value such that the BST equals the required value at the end of the dry period.

**7.2.2** The White Standard Temperature (WST) shall be  $(40 \text{ to } 45) ^\circ\text{C}$ .

*NOTE : The WST is predetermined by the procedure in 7.2.1. It should lie within the specified range, otherwise the manufacturer of the weathering apparatus should be contacted.*

**7.2.3** The spray cycle used shall be 18/102 in accordance with ISO 4892 Part 1

*NOTE : Sample surfaces have to be continuously sprayed during the spray period otherwise the manufacturer of the weathering apparatus should be contacted.*

**7.2.4** The relative humidity during the dry period shall be  $(65 \pm 5) \% \text{ RH}$ .

### 7.3 Test conditions for method 2.

**7.3.1** The Black Standard Temperature (BST) shall be  $(65 \pm 3) ^\circ\text{C}$ . The air temperature in the test enclosure shall be controlled to a constant value such that the BST equals the required value at the end of the dry period.

**7.3.2** The White Standard Temperature (WST) shall be  $(45 \text{ to } 50) ^\circ\text{C}$ .

*NOTE : The WST is predetermined by the procedure in 7.3.1. It should lie within the specified range, otherwise the manufacturer of the weathering apparatus should be contacted.*

**7.3.3** The spray cycle used shall be 6 min spray period and 114 min dry period.

*NOTE : Sample surfaces have to be continuously sprayed during the spray period otherwise the manufacturer of the weathering apparatus should be contacted.*

**7.3.4** The relative humidity during the dry period shall be  $(65 \pm 5) \% \text{ RH}$ .