SLOVENSKI STANDARD
SIST EN ISO 23698:2025

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Kozmetika - Merjenje učinkovitosti zaščite pred soncem z difuzno refleksijsko spektroskopijo (ISO 23698:2024)

Cosmetics - Measurement of the sunscreen efficacy by diffuse reflectance spectroscopy (ISO 23698:2024)

Kosmetische Mittel - Messung der Sonnenschutzwirkung mittels Diffusreflexionsspektroskopie (ISO 23698:2024)

Cosmétiques - Mesurage de l'efficacité des produits de protection solaire par spectroscopie de réflectance diffuse (ISO 23698:2024)

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Cosmetics - Measurement of the sunscreen efficacy by diffuse reflectance spectroscopy (ISO 23698:2024)

Cosmétiques - Mesurage de l'efficacité des produits de protection solaire par spectroscopie de réflectance diffuse (ISO 23698:2024)

Kosmetische Mittel - Messung der Sonnenschutzwirkung mittels Diffusreflexionsspektroskopie (ISO 23698:2024)

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Contents

Page

European foreword **3**

European foreword

This document (EN ISO 23698:2025) has been prepared by Technical Committee ISO/TC 217 "Cosmetics" in collaboration with Technical Committee CEN/TC 392 “Cosmetics” the secretariat of which is held by AFNOR.

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Endorsement notice

The text of ISO 23698:2024 has been approved by CEN as EN ISO 23698:2025 without any modification.

International Standard

ISO 23698

Cosmetics — Measurement of the sunscreen efficacy by diffuse reflectance spectroscopy

Cosmétiques — Mesurage de l'efficacité des produits de protection solaire par spectroscopie de réflectance diffuse

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Contents

Page

Foreword ..... **v**

Introduction ..... **vi**

1 Scope **1**

2 Normative references **1**

3 Terms, definitions and symbols **1**
3.1 Terms and definitions 1
3.2 Symbols 4

4 Principle **5**

5 Apparatus and test method **5**
5.1 In vitro UV spectrophotometer 5
5.2 In vitro substrate/plate 6
5.3 In vivo diffuse reflectance spectrometers (DRS) specifications 6
5.4 Monitoring the DRS systems 7
5.4.1 Monochromatic system 7
5.4.2 Polychromatic system 7
5.5 Test method 7
5.5.1 General 7
5.5.2 Subject exclusion criteria 7
5.5.3 Skin colour of the test subjects 8
5.5.4 Frequency of participation in tests 8
5.5.5 Number of test subjects 8
5.5.6 Ethics and consent 8
5.5.7 Study preparations 8
5.5.8 Unprotected skin remittance measurement 8
5.5.9 Training for Technician performing sunscreen application 9
5.5.10 Sunscreen application to test subject 9
5.5.11 Protected skin remittance measurements 9

6 In vitro spectrophotometer measurements **11**
6.1 General 11
6.2 In vitro measurement preparation 12
6.2.1 Blank reference PMMA plate 12
6.2.2 Product application 12
6.2.3 Product spreading 12
6.2.4 Spreading for alcoholic products 12
6.3 In vitro measurement 13
6.4 Determination of A_{vt0} 13
6.5 Determination of the UV exposure dose 13
6.6 Measurement of in vitro sunscreen-treated plates post-irradiation 14
6.6.1 General 14
6.6.2 Calculation of the $A_{vt1}(\lambda)$ post irradiated spectrum 14
6.7 Determination of the hybridization wavelength 14
6.7.1 Monochromatic system 14
6.7.2 Polychromatic system 15

7 Spectral ratio of photo-degradation (S_{RPD}) **15**
7.1 General 15
7.2 Determination of $S_{RPD}(\lambda)$ 15

8 Calculations to estimate SPF and UVA-PF **16**
8.1 Determination of $A_{HDRSi}(\lambda)$ 16
8.1.1 Determination of $A_{DRSi}(\lambda)$ (monochromatic system) 16
8.1.2 Determination of the A_{DRSi} (polychromatic system) 16
8.1.3 Determination of the individual hybridization scalar value – C_{Ai} 17
8.1.4 Calculation of final hybrid absorbance spectrum 17

8.2 Calculate test material SPF_{HDRSi} ... 18
8.3 Calculate test material $UVA\text{-}PF_i$ ... 18
8.4 Critical wavelength calculation ... 18
8.5 Calculation of the mean and standard deviations for SPF and UVA-PF ... 19
8.6 Statistical criterion ... 20
8.7 Reference standards for SPF and UVA-PF ... 20
8.7.1 Establishment of SPF and UVA-PF for product claim: ... 20
8.7.2 Other calculations ... 20
8.8 Data rejection criteria ... 20
8.8.1 Subject data rejection criterion ... 20
8.8.2 Site-specific data rejection criterion ... 21
8.9 Test failure criteria ... 21

9 Test report ... 21
9.1 General ... 21
9.2 Data in tabular form for each test subject ... 22

Annex A (informative) **Test flow chart monochromatic and polychromatic DRS ... 23**

Annex B (normative) **Calibration check of UV spectrophotometer and plate transmittance test (in vitro measurements) ... 25**

Annex C (normative) **Calibration of solar simulator irradiance and radiometer procedure ... 29**

Annex D (normative) **Test plate and surface specifications ... 35**

Annex E (normative) **Computation values — PPD and erythema action spectra and UVA and UV-SSR spectral irradiances ... 37**

Annex F (normative) **Statistics and calculations ... 40**

Annex G (normative) **SPF, UVA-PF and CW reference sunscreen formulations ... 43**

Annex H (informative) **Definition and examples of valid skin DRS results ... 44**

Annex I (normative) **Optical fibres and calibration ... 46**

Annex J (normative) **Product application ... 47**

Annex K (normative) **ISO 23698 test report ... 50**

Bibliography ... 52

Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 217, *Cosmetics,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 392, *Cosmetics,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Exposure to solar ultraviolet radiation (UVR) is the main environmental source of acute and chronic damage to human skin. Skin cancer is the most prevalent form of cancer of the body and is primarily driven by exposure to sunlight. Protection against exposure to solar UVB and UVA radiation is, therefore, an important public health issue. The use of topically applied sunscreens is a critical part of holistic programs of consumer UVR protection, including the use of appropriate clothing, hats and minimizing exposure to the sun.

The sun protection factor (SPF) has historically been measured by an in vivo method (see ISO 24444) to communicate the magnitude of the protection provided by sunscreens from sunburning UVR. Other test methods have been developed and provided to assess the breadth and magnitude of the protection in the UVA portion of the sun's spectrum (see ISO 24442 and ISO 24443).

This test method given in this document is an alternative to ISO 24443 and ISO 24444 methods.

Invasive methods based on tests conducted on human beings are ethically problematic, time-consuming and very costly. Therefore, it has long been desired to develop alternative methods to assess both the magnitude and breadth of protection afforded by sunscreens that do not require invasive procedures and that reliably provide equivalent testing sensitivity and accuracy as the existing invasive in vivo testing methods.

The hybrid diffuse reflectance spectroscopy method described herein, provides a non-invasive optical assessment of the protection provided by topically applied sunscreen products as measured in situ on human skin as used by consumers, without requiring physiological responses and causing no physical harm to the test subject. By combining full spectrum in vitro spectroscopic measurements of the sunscreen, with optical measurements of the sunscreen transmission in the UVA on human skin, a hybrid spectrum is derived that provides full assessment of both magnitude and breadth of sunscreen protection in both the UVB and UVA regions of the sun's spectrum, correlating closely with in vivo SPF, in vitro UVA-PF and critical wavelength test results demonstrating equivalence of this test method against ISO 24444 and ISO 24443 methods.

Cosmetics — Measurement of the sunscreen efficacy by diffuse reflectance spectroscopy

1 Scope

This document provides a procedure to characterize the sun protection factor (SPF), UVA protection factor (UVA-PF) and critical wavelength (CW) protection of sunscreen products without requiring biological responses. The test method is applicable for emulsions and single-phase products. The method has not been evaluated for use with powder forms sunscreen products.

This document gives specifications to enable determination of the absolute spectral absorbance characteristics of a sunscreen product on skin to estimate sunburn and UVA protection. It is applicable to products that contain any component able to absorb, reflect or scatter ultraviolet (UV) rays and which are intended to be placed in contact with human skin.

2 Normative references

There are no normative references in this document.

3 Terms, definitions and symbols

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1.1
absorbance
A
measure of the energy blocked, either by optical absorption or by physical scattering/reflection

3.1.2
absorbance spectrum
$A(\lambda)$
sunscreen optical absorbance at wavelength λ

Note 1 to entry: Logarithm to the base 10 of the reciprocal of the spectral transmittance τ(λ). $A(\lambda) = -[\log_{10} \tau(\lambda)]$.

3.1.3
absorbance by diffuse reflectance spectroscopy
absorbance by DRS
$A_{DRS}(\lambda)$
absorbance spectrum calculated from DRS as a function of wavelength λ

Note 1 to entry: The absorbance spectrum relevant to this document is 320 nm to 400 nm.

3.1.4
absorbance after hybridization
$A_{HDRS}(\lambda)$
final absorbance spectrum calculated from the hybridized signals as a function of wavelength λ after correction for photo-degradation

Note 1 to entry: The final absorbance spectrum is 290 nm to 400 nm

3.1.5
calibration factor
C_{cal}
correction applied to a measured quantity value to compensate for a known systematic effect

3.1.6
in vitro UV absorbance spectrum pre irradiation
in vitro absorbance before UV exposure (pre irradiation)
$A_{vt0}(\lambda)$
arithmetic mean in vitro absorbance spectrum of a sunscreen product measured before UV exposure

Note 1 to entry: The absorbance spectrum is 290 nm to 400 nm.

3.1.7
in vitro UV absorbance spectrum post irradiation
in vitro absorbance after UV exposure (post irradiation)
$A_{vt1}(\lambda)$
arithmetic mean in vitro absorbance spectrum of a sunscreen product measured after UV exposure

Note 1 to entry: The absorbance spectrum is 290 nm to 400 nm.

3.1.8
hybridization constant
C_{Ai}
scalar factor to adjust an in vitro spectrum A_{vt1} (λ) at each wavelength to the individual A_{DRSi}

3.1.9
critical wavelength
CW
λ_c
wavelength at which the area under the absorbance curve represents 90 % of the total area under the curve in the UV region

3.1.10
dose
D
UVA radiant exposure dose for pre-irradiation of sunscreen products (1,2 x UVA-PF_{DRS} J/cm^2)

3.1.11
wavelength step
$d\lambda$
differential of integration (1 nm)

3.1.12
diffuse reflectance spectroscopy
DRS
technique used to measure the remitted light from skin or skin remittance.

Note 1 to entry: Using this technique, the UVA absorbance spectrum of a sunscreen product applied on skin in vivo can be determined.

Note 2 to entry: The term “light” is used generically to describe electromagnetic radiation from both UV and visible wavelengths of optical spectrum throughout the document. It is differentiated as needed in specific sections of the document.