

# DIN EN ISO 23698:2025-04 (E)

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

---

### Contents

Page

European foreword .....	4
Foreword .....	5
Introduction .....	6
<b>1 Scope</b> .....	<b>7</b>
<b>2 Normative references</b> .....	<b>7</b>
<b>3 Terms, definitions and symbols</b> .....	<b>7</b>
3.1 Terms and definitions .....	7
3.2 Symbols .....	10
<b>4 Principle</b> .....	<b>11</b>
<b>5 Apparatus and test method</b> .....	<b>11</b>
5.1 In vitro UV spectrophotometer .....	11
5.2 In vitro substrate/plate .....	12
5.3 In vivo diffuse reflectance spectrometers (DRS) specifications .....	12
5.4 Monitoring the DRS systems .....	13
5.4.1 Monochromatic system .....	13
5.4.2 Polychromatic system .....	13
5.5 Test method .....	13
5.5.1 General .....	13
5.5.2 Subject exclusion criteria .....	13
5.5.3 Skin colour of the test subjects .....	14
5.5.4 Frequency of participation in tests .....	14
5.5.5 Number of test subjects .....	14
5.5.6 Ethics and consent .....	14
5.5.7 Study preparations .....	14
5.5.8 Unprotected skin remittance measurement .....	14
5.5.9 Training for Technician performing sunscreen application .....	15
5.5.10 Sunscreen application to test subject .....	15
5.5.11 Protected skin remittance measurements .....	15
<b>6 In vitro spectrophotometer measurements</b> .....	<b>17</b>
6.1 General .....	17
6.2 In vitro measurement preparation .....	18
6.2.1 Blank reference PMMA plate .....	18
6.2.2 Product application .....	18
6.2.3 Product spreading .....	18
6.2.4 Spreading for alcoholic products .....	18
6.3 In vitro measurement .....	19
6.4 Determination of $A_{vt0}$ .....	19
6.5 Determination of the UV exposure dose .....	19
6.6 Measurement of in vitro sunscreen-treated plates post-irradiation .....	20
6.6.1 General .....	20
6.6.2 Calculation of the $A_{vt1}(\lambda)$ post irradiated spectrum .....	20
6.7 Determination of the hybridization wavelength .....	20
6.7.1 Monochromatic system .....	20
6.7.2 Polychromatic system .....	21
<b>7 Spectral ratio of photo-degradation (<math>S_{RPD}</math>)</b> .....	<b>21</b>
7.1 General .....	21
7.2 Determination of $S_{RPD}(\lambda)$ .....	21

<b>8</b>	<b>Calculations to estimate SPF and UVA-PF</b> .....	<b>22</b>
8.1	Determination of $A_{\text{HDRSi}}(\lambda)$ .....	22
8.1.1	Determination of $A_{\text{DRSi}}(\lambda)$ (monochromatic system).....	22
8.1.2	Determination of the $A_{\text{DRSi}}$ (polychromatic system).....	22
8.1.3	Determination of the individual hybridization scalar value – $C_{\text{Ai}}$ .....	23
8.1.4	Calculation of final hybrid absorbance spectrum.....	23
8.2	Calculate test material $\text{SPF}_{\text{HDRSi}}$ .....	24
8.3	Calculate test material UVA-PF <sub>i</sub> .....	24
8.4	Critical wavelength calculation.....	24
8.5	Calculation of the mean and standard deviations for SPF and UVA-PF.....	25
8.6	Statistical criterion.....	26
8.7	Reference standards for SPF and UVA-PF.....	26
8.7.1	Establishment of SPF and UVA-PF for product claim:.....	26
8.7.2	Other calculations.....	26
8.8	Data rejection criteria.....	26
8.8.1	Subject data rejection criterion.....	26
8.8.2	Site-specific data rejection criterion.....	27
8.9	Test failure criteria.....	27
<b>9</b>	<b>Test report</b> .....	<b>27</b>
9.1	General.....	27
9.2	Data in tabular form for each test subject.....	28
	<b>Annex A (informative) Test flow chart monochromatic and polychromatic DRS</b> .....	<b>29</b>
	<b>Annex B (normative) Calibration check of UV spectrophotometer and plate transmittance test (in vitro measurements)</b> .....	<b>31</b>
	<b>Annex C (normative) Calibration of solar simulator irradiance and radiometer procedure</b> .....	<b>35</b>
	<b>Annex D (normative) Test plate and surface specifications</b> .....	<b>41</b>
	<b>Annex E (normative) Computation values — PPD and erythema action spectra and UVA and UV-SSR spectral irradiances</b> .....	<b>43</b>
	<b>Annex F (normative) Statistics and calculations</b> .....	<b>46</b>
	<b>Annex G (normative) SPF, UVA-PF and CW reference sunscreen formulations</b> .....	<b>49</b>
	<b>Annex H (informative) Definition and examples of valid skin DRS results</b> .....	<b>50</b>
	<b>Annex I (normative) Optical fibres and calibration</b> .....	<b>52</b>
	<b>Annex J (normative) Product application</b> .....	<b>53</b>
	<b>Annex K (normative) ISO 23698 test report</b> .....	<b>56</b>
	<b>Bibliography</b> .....	<b>58</b>