

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
1 Scope.....	7
2 Normative references.....	7
3 Terms, definitions and symbols.....	7
3.1 Terms and definitions	7
3.2 Symbols.....	10
4 Principle.....	11
5 Apparatus and test method.....	11
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
6 In vitro spectrophotometer measurements.....	17
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
7 Spectral ratio of photo-degradation (S_{RPD}).....	21
7.1 General.....	21
7.2 Determination of $S_{RPD}(\lambda)$	21

8	Calculations to estimate SPF and UVA-PF	22
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_{DRSi} (polychromatic system)	22
8.1.3	Determination of the individual hybridization scalar value – C_{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 _i	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
9	Test report	27
9.1	General	27
9.2	Data in tabular form for each test subject	28
	Annex A (informative) Test flow chart monochromatic and polychromatic DRS	29
	Annex B (normative) Calibration check of UV spectrophotometer and plate transmittance test (in vitro measurements)	31
	Annex C (normative) Calibration of solar simulator irradiance and radiometer procedure	35
	Annex D (normative) Test plate and surface specifications	41
	Annex E (normative) Computation values — PPD and erythema action spectra and UVA and UV-SSR spectral irradiances	43
	Annex F (normative) Statistics and calculations	46
	Annex G (normative) SPF, UVA-PF and CW reference sunscreen formulations	49
	Annex H (informative) Definition and examples of valid skin DRS results	50
	Annex I (normative) Optical fibres and calibration	52
	Annex J (normative) Product application	53
	Annex K (normative) ISO 23698 test report	56
	Bibliography	58