ISO 24442:2022-06 (E)

Cosmetics - Sun protection test methods - In vivo determination of sunscreen UVA protection

Contents

Page

Foreword ..... **v**

Introduction ..... **vi**

1 Scope **1**

2 Normative references **1**

3 Terms and definitions **1**

4 General principle **3**

5 Test subjects **3**
5.1 Selection of the test subjects 3
5.1.1 General 3
5.1.2 Skin colour of the test subjects 4
5.1.3 Age restriction 4
5.1.4 Frequency of participation in tests 4
5.1.5 Ethics and consent 4
5.2 Number of test subjects 4

6 Apparatus and materials— Source of ultraviolet radiation **4**
6.1 General 4
6.2 Quality of ultraviolet radiation 5
6.3 Total irradiance (UV, visible and near infrared rays) 5
6.4 Uniformity of beam 5
6.4.1 General 5
6.4.2 Film densitometry 5
6.4.3 UV sensor 6
6.4.4 Large beam source 6
6.4.5 Small beam source 6

7 Maintenance and monitoring the UV solar simulator output **7**
7.1 Spectroradiometry 7
7.2 Radiometry 8

8 Reference sunscreen formulations **8**
8.1 General 8
8.2 Reference standard to be used 9

9 Procedure **9**
9.1 Main steps 9
9.2 Test conditions 10
9.3 Position of the test subjects 10
9.4 Product application 10
9.4.1 Overview 10
9.4.2 General 10
9.4.3 Amount of product applied 10
9.4.4 Mode of delivery 11
9.4.5 Evaluation of application uniformity 13
9.4.6 Drying time between application and UV exposure 13
9.4.7 Exposure sub-sites 13
9.5 UV exposure 13
9.5.1 Provisional $MPPDD_{iu}$ 13
9.5.2 Estimated $MPPDD_{iu}$ 13
9.5.3 Incremental progression of UV dose 13

9.6 Product removal 14
9.7 Procedure for MPPDD assessment 14
9.7.1 General 14
9.7.2 Time of assessment of MPPDD 14
9.7.3 Grading scale for the $MPPDD_i$s 15
9.7.4 Erythema responses 15
9.7.5 Data rejection criteria 15
9.7.6 Test failure criteria 16
9.7.7 Expression of MPPDDs 16

10 Calculation of the UVA protection factor and statistics 16
10.1 Calculation of the individual UVAPF ($UVAPF_i$) 16
10.2 Calculation of product UVAPF 17
10.3 Statistical criterion 17
10.4 Validation of the test 17

11 Test report 17
11.1 Overview 17
11.2 General information 17
11.3 Data in tabular for each test subject 18
11.4 Statistics for the test products 18

Annex A (normative) **Selection criteria for the test subjects 19**

Annex B (normative) **Definition of the source of UVA radiation 21**

Annex C (normative) **UVAPF reference sunscreens formulations 24**

Annex D (normative) **Calculations and statistics 37**

Annex E (normative) **Colorimetric determination of skin colour typing 43**

Annex F (informative) **Visual guidance for PPD grading— Visual appearance of PPD 45**

Annex G (informative) **Sample report form 52**

Bibliography 56