

DIN EN 14500:2021-09 (E)

Blinds and shutters - Thermal and visual comfort - Test and calculation methods

Contents		Page
	European foreword	5
	Introduction	6
1	Scope	7
2	Normative references	7
3	Terms and definitions	8
3.1	Processes	8
3.2	Characteristics	9
3.3	Angle definitions	10
4	Notations used	12
4.1	General	12
4.2	Visual or solar properties	13
4.3	Geometry of the radiation	13
4.4	Optical factors	15
5	Test and calculation methods to be used according to product - Guidelines	15
5.1	General	15
5.2	Venetian blinds and louvres	16
5.3	Roller blinds	16
5.4	Pleated blinds	16
5.5	Projecting awnings	16
5.6	Shutters	16
6	Determination of transmittance and reflectance with an integrating sphere	17
6.1	Measurement principles	17
6.1.1	Spectral and integral methods	17
6.1.2	Absolute and relative measurements (according to CIE 130)	17
6.2	Measuring equipment	18
6.2.1	General	18
6.2.2	Equipment for irradiation	18
6.2.3	Equipment for detection	22
6.3	Reference samples	25
6.4	Test samples	26
6.4.1	General	26
6.4.2	Samples with directional features	26
6.4.3	Samples with scattering properties	26
6.4.4	Thick translucent samples	26
6.5	Measurement procedures	27
6.5.1	General	27
6.5.2	Warm-up	27
6.5.3	Preliminary checks of the samples	28
6.5.4	Test method A - Single beam integrating sphere (substitution method)	31
6.5.5	Test method B - "Quasi-simultaneous" double beam integrating sphere	37
6.5.6	Test method C - "Sequential" double-beam integrating sphere	45
7	Determination of n-n and dir-dir from direct measurement	50
7.1	Measurement principle	50
7.2	Measuring equipment	50

7.2.1	General	50
7.2.2	Equipment for irradiation	50
7.2.3	Equipment for detection	50
7.2.4	Equipment for accurate positioning of the optical components and sample	50
7.3	Test samples	51
7.4	Measurement procedure	51
7.4.1	Determination of n-n	51
7.4.2	Determination of dir-dir	54
8	Determination of the cut-off angle	55
8.1	General	55
8.2	Measurement of a directional cut-off angles dir(), for a specific rotation angle	56
8.3	Determination of all directional cut-off angles dir	57
8.4	Determination of the cut-off angle	58
9	Determination of darkening performance of solar protection devices and opacity performance of curtain materials	58
9.1	General	58
9.2	Qualification of the observer and testing conditions	58
9.3	Samples	59
9.4	Test equipment	59
9.4.1	General	59
9.4.2	Area 1 - Illumination of the sample	60
9.4.3	Area 2 - Observation of the sample	61
9.5	Test procedure	62
9.5.1	Curtain material testing	62
9.5.2	Product testing	63
10	Calculation of the diffuse hemispherical transmittance dif-h	64
10.1	Fabrics and other products with rotationally symmetric transmittance	64
10.2	Venetian blinds and other products with transmittance with profile angle symmetry	64
11	Test report	65
Annex A (informative)	Examples of test equipment for darkening and opacity characteristics determination	66
A.1	General	66
A.2	Example 1	66
A.3	Example 2	68
Annex B (informative)	Determination of openness coefficient	70
B.1	Method for fabrics made from opaque material	70
B.2	Method for venetian blinds	70
Annex C (informative)	Determination of infrared properties	71
C.1	General	71
C.2	Determination	71
Annex D (informative)	Approach in case of projecting solar protection devices	74
D.1	General	74
D.2	Detailed model	74
D.3	Simplified approach for summer	76
D.4	Examples of calculation	76
Annex E (informative)	Decision tree for critical samples	80
Annex F (informative)	Additional information for venetian blinds and louveres	81

F.1	Venetian blinds	81
F.2	Louvres	83
Annex G (informative) Additional information for shutters		84
Bibliography		85