DIN EN 207:2017-05 (E)

Personal eye-protection equipment - Filters and eye-protectors against laser radiation (laser eye-protectors)

Contents

Page

European foreword 5

1 Scope 6

2 Normative references 6

3 Requirements 6
3.1 Spectral transmittance of filters and frames 6
3.2 Luminous transmittance of filters 6
3.3 Resistance of filters and frames to laser radiation 7

Table 1 -- Scale numbers (maximum spectral transmittance and resistance to laser radiation) of the filters and/or eye-protectors against laser radiations 7
3.4 Refractive values of filters and eye-protectors 7

Table 2 -- Maximum refractive values of filters and eye-protectors with no corrective effect 8
3.5 Quality of material and surface of filters 8
3.5.1 Material and surface defects 8
3.5.2 Diffusion of light 8
3.6 Stability of filters and eye-protectors to ultraviolet radiation and elevated temperature 8
3.6.1 Stability to ultraviolet radiation 8
3.6.2 Stability at elevated temperature 8
3.7 Resistance of filters and frames to ignition by contact with hot surfaces 9
3.8 Field of vision of eye-protectors 9
3.9 Construction of filters and frames 9
3.10 Mechanical strength of eye-protectors 9
3.10.1 Basic requirement 9
3.10.2 Optional requirements 9

4 Testing 9
4.1 General 9

Table 3 --Test schedule for filters, frames and complete eye-protectors for protection against laser radiation 10
4.2 Spectral transmittance of filters and frames 11
4.3 Luminous transmittance of filters 11
4.4 Resistance of filters and frames to laser radiation 11

Table 4 -- Duration of test for filters and eye-protectors against laser radiation 11
4.5 Refractive value of filters and eye-protectors 12
4.6 Quality of material and surface of filters 12
4.6.1 Material and surface defects 12
4.6.2 Diffusion of light 12
4.7 Stability to UV radiation and stability to elevated temperature 12
4.7.1 Stability to UV radiation 12
4.7.2 Stability to elevated temperature 12
4.8 Resistance of filters and frames to ignition by contact with hot surfaces 12
4.9 Field of vision of eye-protectors 12

Figure 1 -- Example of test set-up for the measurement of field of vision 13
4.10 Determination of the protected range 13

4.11 Frames ... 14
4.12 Mechanical strength ... 14

5 Information supplied by the manufacturer ... 14

6 Marking ... 14
6.1 Eye-protectors ... 14
6.2 Filters ... 16

Annex A (informative) Principle ... 17

A.1 Limit values and time base ... 17

Table A.1 -- Simplified maximum permissible irradiation values for the cornea ... 17

Figure A.1 -- Comparison of the limit values specified in EU 2006/25/EC and the simplified A.2 Beam areas ... 18
A.3 Angle dependence ... 18
A.4 Example test report ... 19

Table A.2 -- Test report ... 19

Annex B (informative) Recommendations for the use of laser radiation eye-protectors ... 21

B.1 General ... 21
B.2 Types of lasers ... 21

Table B.1 -- Recommended scale numbers for use of filters and eye-protectors against laser radiation ... 22
B.3 Determination of the scale numbers ... 22
B.3.1 General ... 22
B.3.2 Continuous wave laser (D) ... 23
B.3.3 Pulsed lasers (I, R), pulse duration 10-9 s ... 23
B.3.3.1 General ... 23
B.3.3.2 Calculation for the pulsed mode ... 23

Table B.2 -- Periods of time Ti below which energies of single pulses have to be added and maximum pulse repetition frequencies vmax = 1/Ti for the application of formula (B.4) ... 24
B.3.3.3 Calculation for the average power ... 24
B.3.4 Mode coupled lasers (M), pulse duration < 10-9 s ... 24
B.3.4.1 General ... 24
B.3.4.2 Calculation for the pulsed mode ... 24
B.3.4.2.1 Wavelength range 400 nm to 1 400 nm ... 24
B.3.4.2.2 Wavelength ranges < 400 nm and > 1 400 nm ... 24
B.3.4.3 Calculation for the average power ... 25
B.4 Time base ... 25
B.5 Filters in appliances ... 25

Annex C (informative) Significant technical changes between this European Standard and the previous editions ... 26

Annex ZA (informative) Relationship between this European Standard and the essential requirements of Directive 89/686/EEC aimed to be covered ... 27

Table ZA.1 -- Correspondence between this European Standard and Directive 89/686/EEC ... 27

Bibliography ... 28