

# DIN 5031-10:2018-03 (E)

## Optical radiation physics and illuminating engineering - Part 10: Photobiologically effective radiation, quantities, symbols and action spectra

---

<b>Contents</b>	<b>Page</b>
Foreword .....	3
Introduction .....	5
1 Scope .....	6
2 Normative references .....	6
3 Terms and definitions.....	6
4 Photobiological effects .....	8
4.1 General .....	8
4.2 Inactivation of microorganisms (abbreviation: ia).....	10
4.3 Effects on and via human skin.....	13
4.3.1 General .....	13
4.3.2 Effects via DNA photoproducts .....	13
4.3.3 Other effects of photochemical genesis.....	24
4.3.4 Effects with photosensitisers .....	28
4.3.5 Warming effects in the skin due to optical radiation .....	31
4.4 Effects on and via the eye.....	32
4.4.1 General .....	32
4.4.2 Photoconjunctivitis (abbreviation: ko).....	33
4.4.3 Photokeratitis (abbreviation: ke).....	34
4.4.4 Cataract of the eye lens (abbreviation: ka).....	35
4.4.5 Blue light hazard (abbreviation: blh) .....	35
4.4.6 Retinal thermal hazard (abbreviation: rth) .....	37
4.5 Ultraviolet health hazard (abbreviation: uvh) .....	40
4.6 Effects on plants.....	42
4.6.1 General .....	42
4.6.2 Photosynthesis (abbreviation: sy).....	42
4.6.3 Chlorophyll photosynthesis (abbreviation: ch) .....	44
4.6.4 Photomorphogenesis (abbreviation: mo).....	44
4.6.5 Phototropism (abbreviation: tp).....	47
4.6.6 UV plant damage (abbreviation: cdw).....	48
Annex A (normative) Action spectra represented in numerical form.....	49
Annex B (informative) Effect of optical radiation via receptors of the retina.....	96
B.1 Effect via cones and rods.....	96
B.2 Effect via retinal ganglion cells.....	96
Annex C (informative) Interpolation of action spectra and integration of the effective radiant power .....	98
C.1 Interpolation of action spectra .....	98
C.2 Integration of spectral ranges — practical summation .....	98
C.3 Generalised consideration .....	99
Bibliography.....	101