Table 2.3

Exposure limit values for laser exposure to the eye — Long exposure duration ≥ 10 s

Wavelength[a] [nm]		Aperture	Duration [s]		
			10^1 - 10^2	10^2 - 10^4	10^4 - $3 \cdot 10^4$
UVC	180 - 280	3,5 mm	$H = 30$ [J m^{-2}]		
UVB	280 - 302				
	303		$H = 40$ [J m^{-2}]		
	304		$H = 60$ [J m^{-2}]		
	305		$H = 100$ [J m^{-2}]		
	306		$H = 160$ [J m^{-2}]		
	307		$H = 250$ [J m^{-2}]		
	308		$H = 400$ [J m^{-2}]		
	309		$H = 630$ [J m^{-2}]		
	310		$H = 1{,}0 \cdot 10^3$ [J m^{-2}]		
	311		$H = 1{,}6 \cdot 10^3$ [J m^{-2}]		
	312		$H = 2{,}5 \cdot 10^3$ [J m^{-2}]		
	313		$H = 4{,}0 \cdot 10^3$ [J m^{-2}]		
	314		$H = 6{,}3 \cdot 10^3$ [J m^{-2}]		
UVA	315 - 400		$H = 10^4$ [J m^{-2}]		
Visible 400 – 700	400 - 600 Photochemical[b] Retinal damage	7 mm	$H = 100\ C_B$ [J m^{-2}] ($\gamma = 11$ mrad)[d]	$E = 1\ C_B$ [W m^{-2}]; ($\gamma = 1{,}1\ t^{0{,}5}$ mrad)[d]	$E = 1\ C_B$ [W m^{-2}] ($\gamma = 110$ mrad)[d]
	400 - 700 Thermal[b] Retinal damage		if $\alpha < 1{,}5$ mrad then $E = 10$ [W m^{-2}] if $\alpha > 1{,}5$ mrad and $t \leq T_2$ then $H = 18\ C_E\ t^{0{,}75}$ [J m^{-2}] if $\alpha > 1{,}5$ mrad and $t > T_2$ then $E = 18\ C_E\ T_2^{-0{,}25}$ [W m^{-2}]		
IRA	700 - 1 400	7 mm	if $\alpha < 1{,}5$ mrad then $E = 10\ C_A\ C_C$ [W m^{-2}] if $\alpha > 1{,}5$ mrad and $t \leq T_2$ then $H = 18\ C_A\ C_C\ C_E\ t^{0{,}75}$ [J m^{-2}] if $\alpha > 1{,}5$ mrad and $t > T_2$ then $E = 18\ C_A\ C_C\ C_E\ T_2^{-0{,}25}$ [W m^{-2}] (not to exceed 1 000 W m^{-2})		
IRB & IRC	1 400 - 10^6	See[c]	$E = 1\ 000$ [W m^{-2}]		

a If the wavelength or another condition of the laser is covered by two limits, then the more restrictive applies.

b For small sources subtending an angle of 1,5 mrad or less, the visible dual limits E from 400 nm to 600 nm reduce to the thermal limits for 10 s≤ $t<T_1$ and to photochemical limits for longer times. For T_1 and T_2 see Table 2.5. The photochemical retinal hazard limit may also be expressed as a time integrated radiance $G = 10^6\ C_B$ [J m^{-2} sr^{-1}] for t > 10s up to t = 10 000 s and $L = 100\ C_B$ [W m^{-2} sr^{-1}] for t > 10 000 s. For the measurement of G and L γ_m must be used as averaging field of view. The official border between visible and infrared is 780 nm as defined by the CIE. The column with wavelength band names is only meant to provide better overview for the user. (The notation G is used by CEN; the notation L_t is used by CIE; the notation L_P is used by IEC and CENELEC.)

c For wavelength 1 400 - 10^5 nm : aperture diameter = 3,5 mm; for wavelength 10^5 - 10^6 nm: aperture Diameter = 11 mm.

d For measurement of the exposure value the consideration of γ is defined as follows: If α (angular subtense of a source) > γ (limiting cone angle, indicated in brackets in the corresponding column) then the measurement field of view γ_m should be the given value of γ. (If a larger measurement field of view is used, then the hazard would be overestimated).
If $\alpha < \gamma$ then the measurement field of view γ_m must be large enough to fully enclose the source but is otherwise not limited and may be larger than γ.