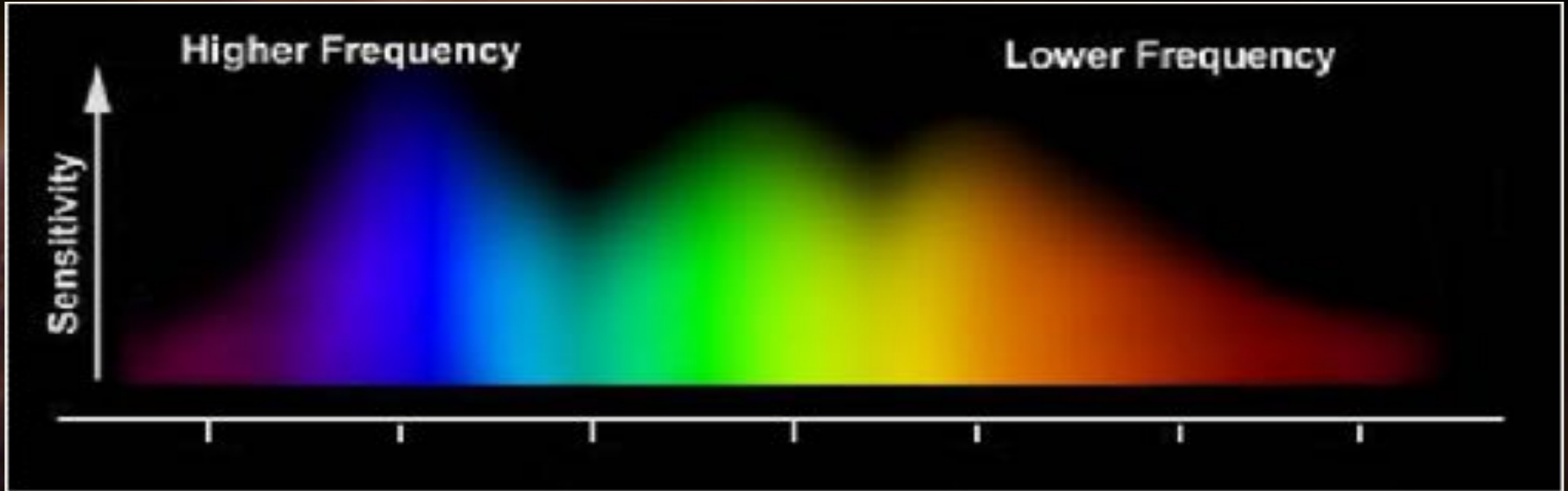


Dangers of Light

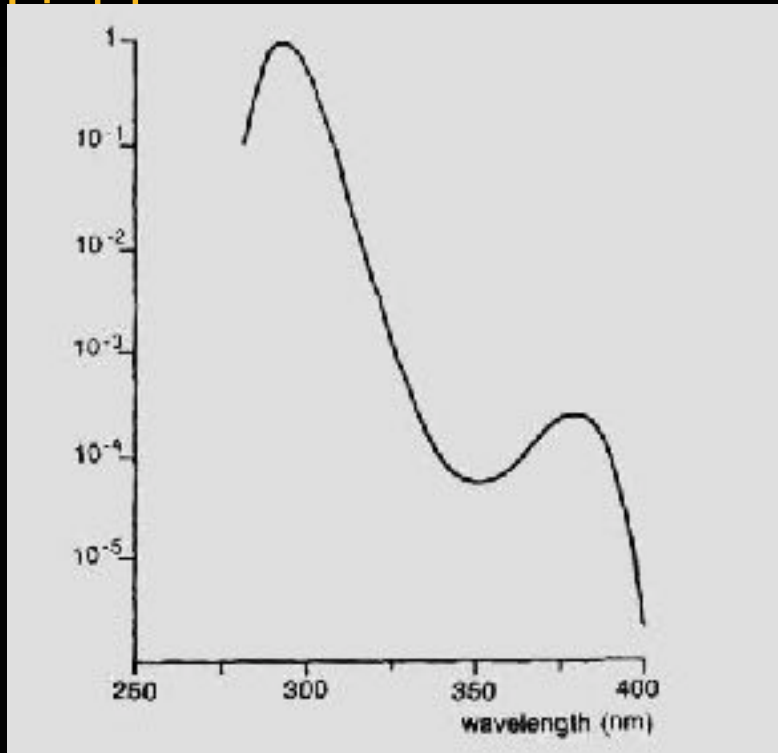


Content of Sunlight



Percentage: Visible Light 32 %
Infrared Light 65 %
UV-Light 3 %

Degree of Efficiency (Danger) of UV-



UV-C: 100 - 280 nm

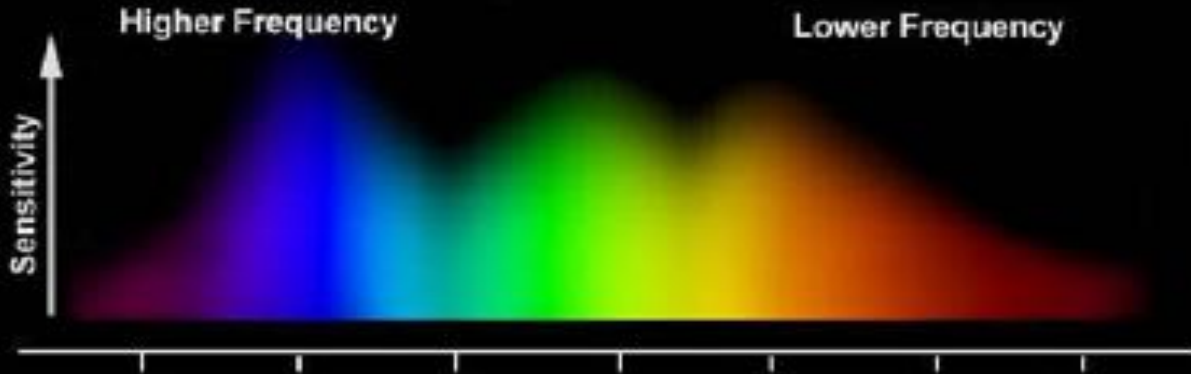
UV-B: 280 - 315 nm

UV-A: 315 - 380 nm

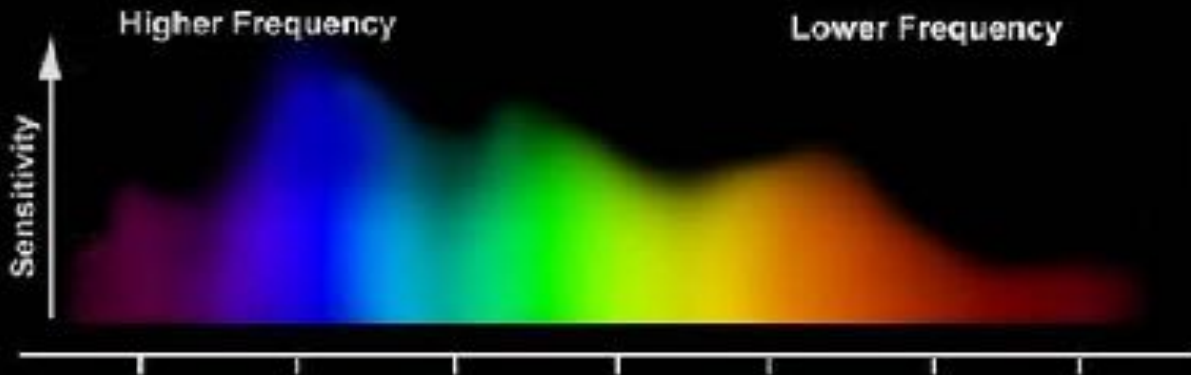
Hazards of UV-Light

- Sunburn
- Cataract
- Skin Cancer
- Snow-Blindness
- Conjunctivitis („Sand in the Eyes“)

UV Content in HMI Lights



Spectrum of Sunlight



Spectrum of HMI-Light

According to OSRAM up to 10% of Input Wattage exits an HMI-Lamp as UV-Light.

Hazards of HMI Lights



Prince Haakon of Norway after 3 hours of exposure to four 400 Watt Bron-Kobold HMI-Lights and bright sunlight.

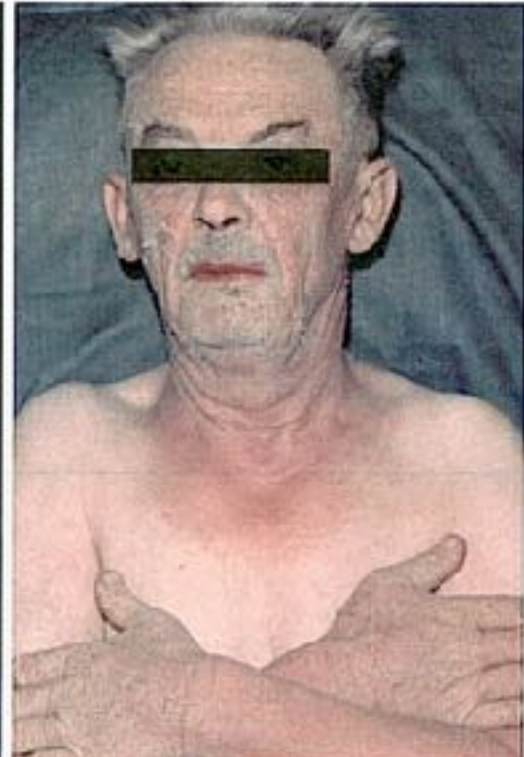
Hazards of HMI Lights



Photoallergic reaction.
**Only textil covered skin is
unconcerned**



Pharmaceutical
reaction with UV-A

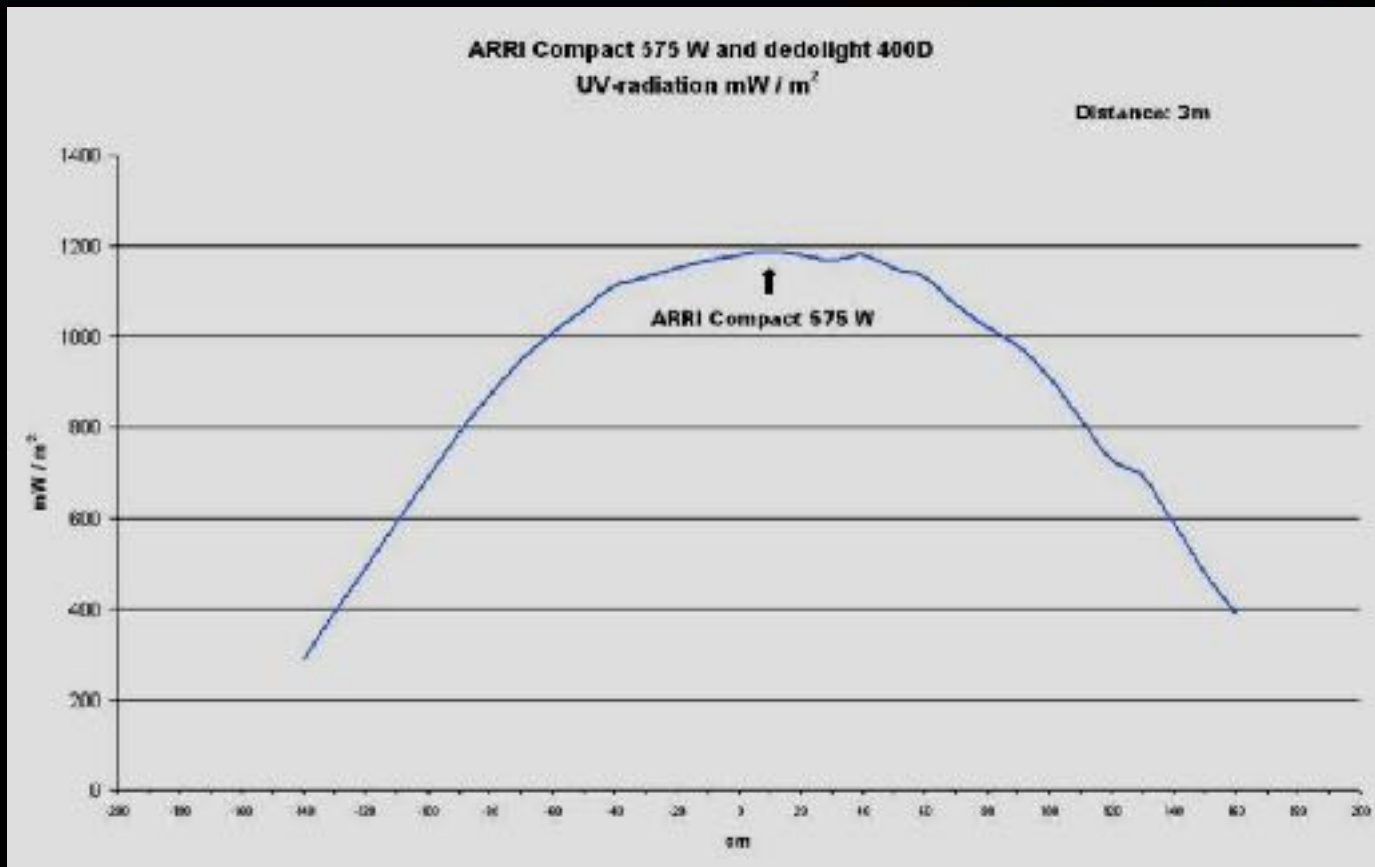


Neurodermatitis because of
to much UV exposure

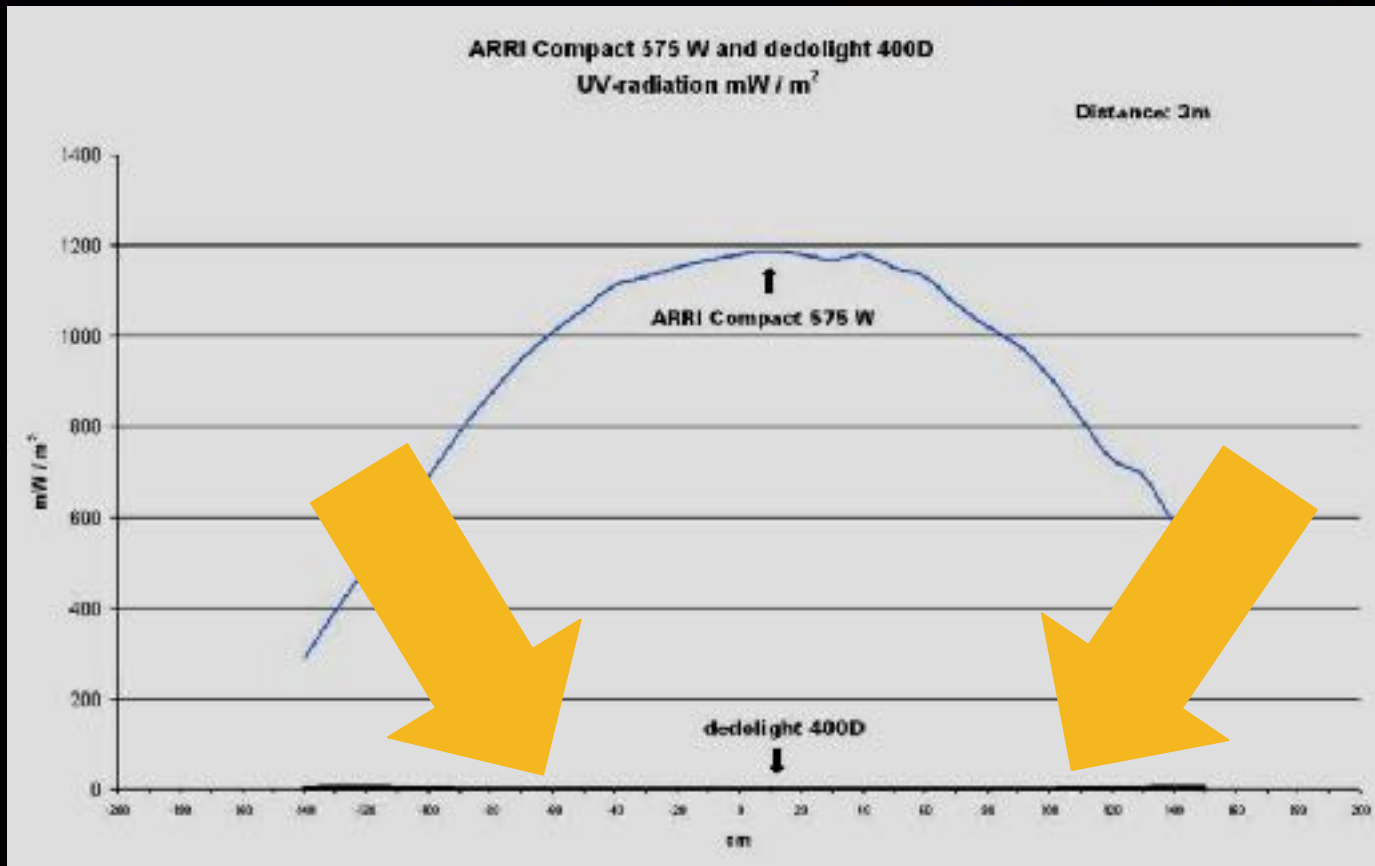


UV-Protection Technology

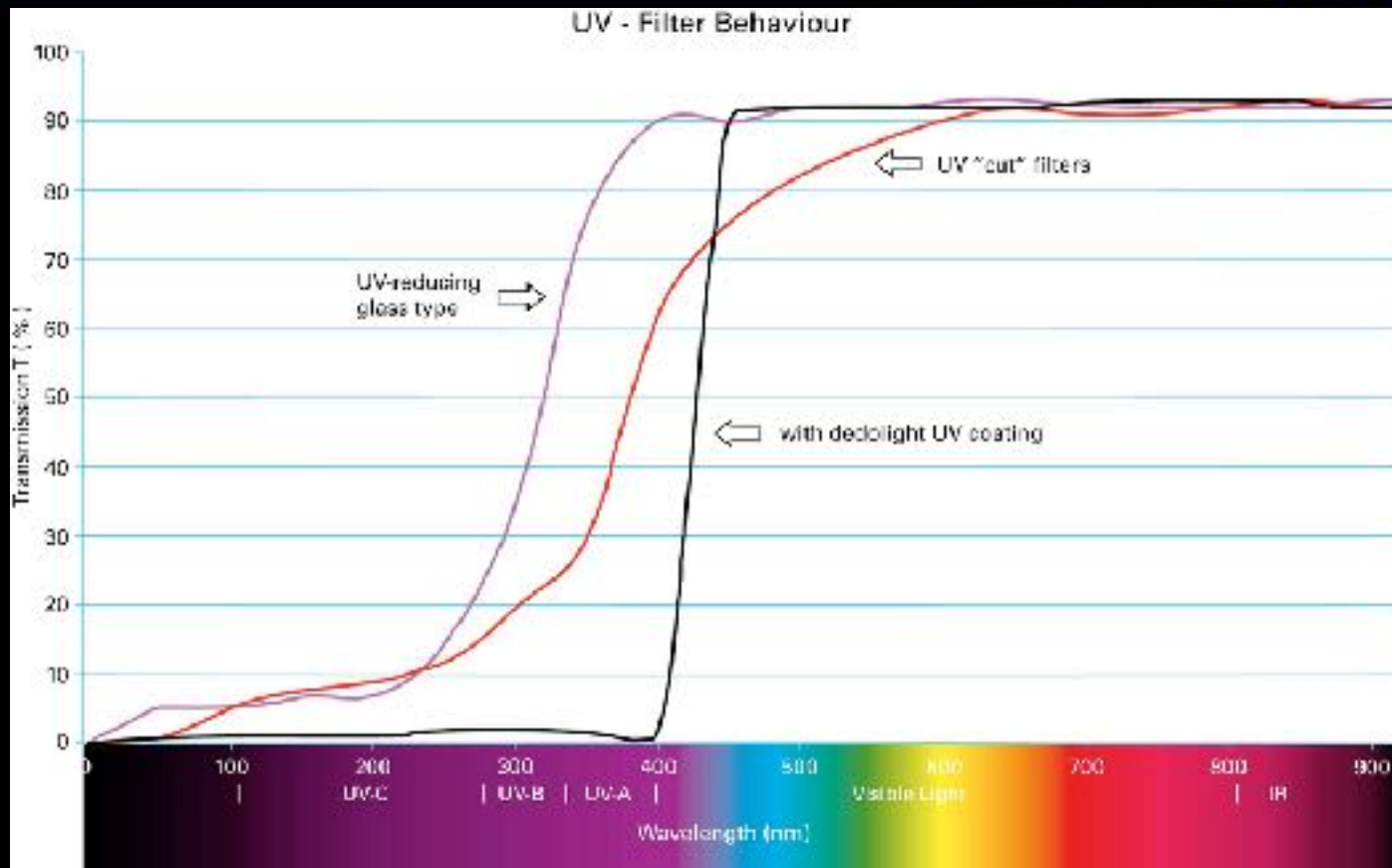
Comparison of UV-Filters



Comparison of UV-Filters

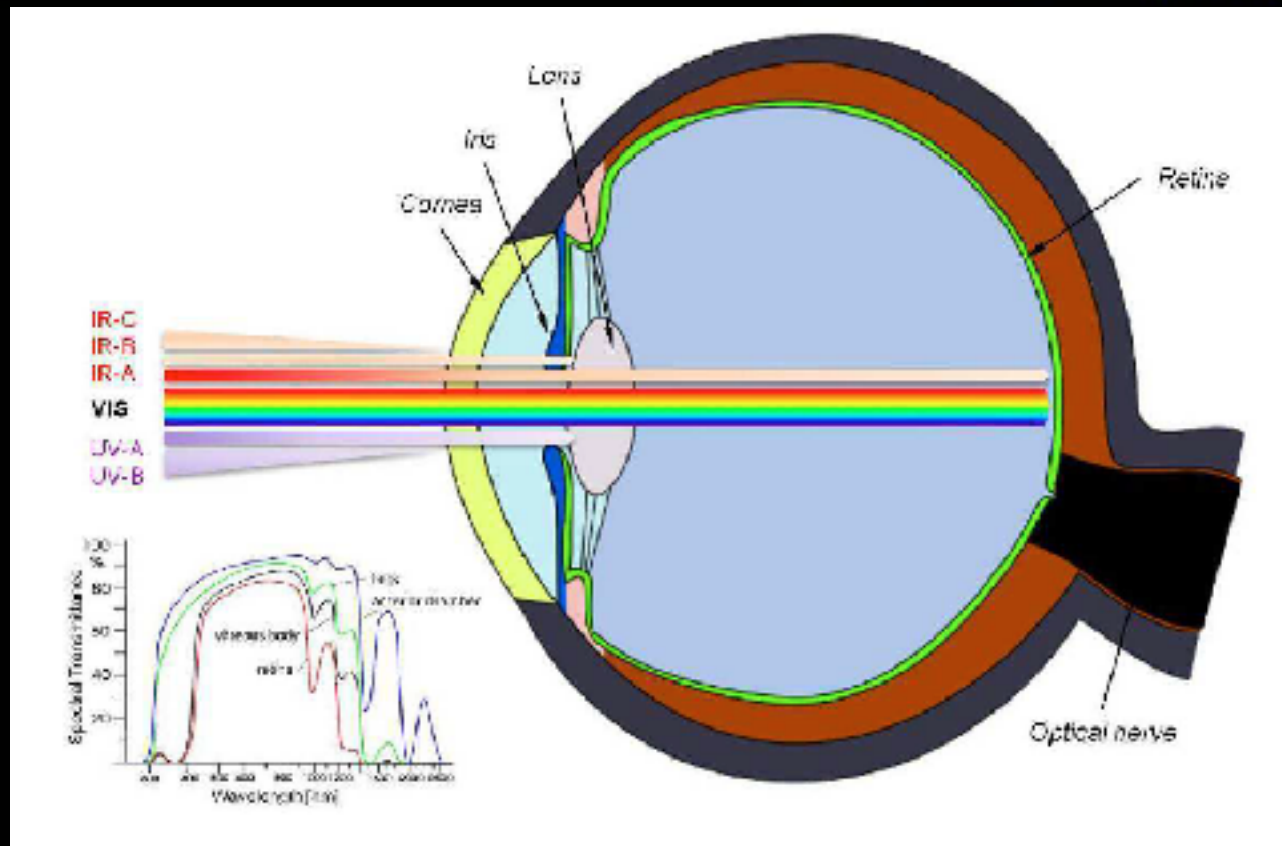


Comparison of UV-Filters

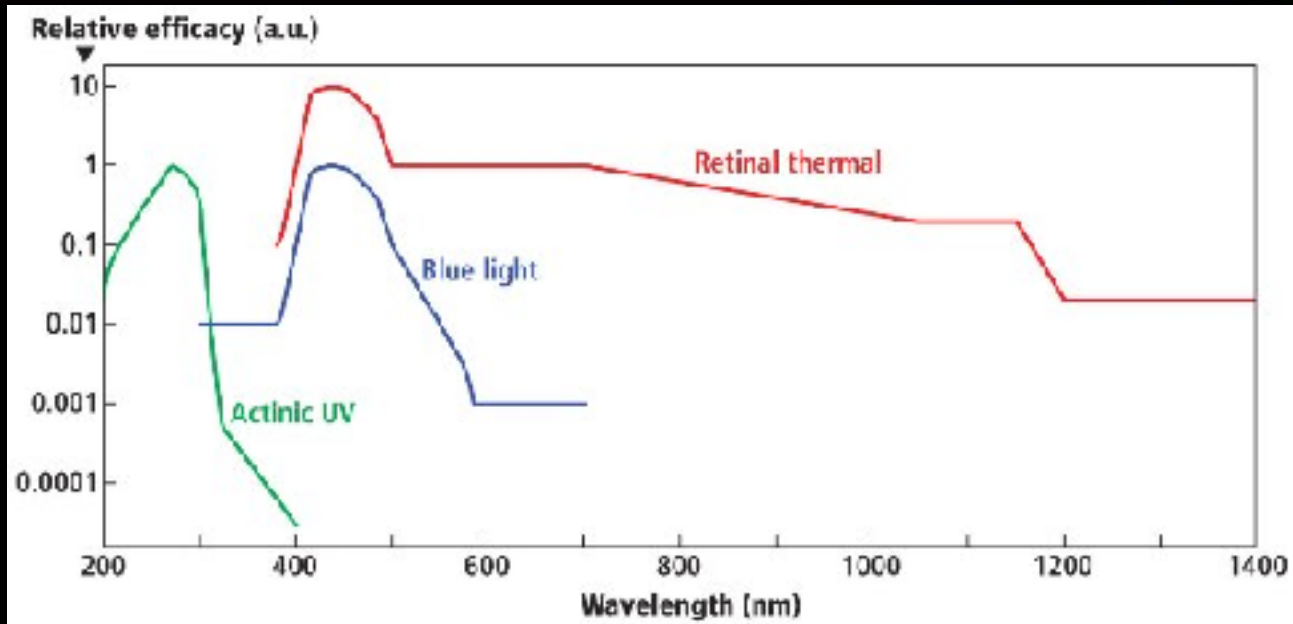


IEC/EN 62471

Penetration of Optical Radiation



Hazard weighting functions



Actinic UV (200-400nm): risk of infection of retina and sunburn

Blue Light (380-600nm): photochemical damage of retina

Retinal thermal (visible spectrum): thermal damage of retina

Risk groups

Risk Group	Safety Message	Exposure periods to determinate (emission limits)	
		Retinal Photochemical Hazard	Retinal Thermal Hazard
Risk Group „exempt“ (RG 0)	No photobiological hazard	10 000 s (100 W/m ² sr) (1W/m ²)*	10 s (28 000/a W/m ² sr)
Risk Group „low risk“ (RG 1)	No hazard due to normal behavioral limitations on exposure	100 s (10 000 W/m ² sr) (1W/m ²)*	10 s (28 000/a W/m ² sr)
Risk Group „moderate“ (RG 2)	No hazard due to the aversion reponse to very bright light sources or due to thermal discomfort	0.25 s (4x10 ⁶ W/m ² sr) (400 W/m ²)*	0.25 s (71 000/a W/m ² sr)

* Emission limit for small sources with radiation power

