

KAN position paper on artificial, biologically effective lighting in standards

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More information concerning artificial, biologically effective lighting can be found at
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1 KAN's position

The Commission for Occupational Health and Safety and Standardization (KAN) takes the view that:

- disturbances to humans' circadian rhythm caused by artificial, biologically effective lighting must be prevented;
- the knowledge available on artificial, biologically effective lighting has not been sufficiently validated to allow design requirements to be specified;
- the main impact of artificial, biologically effective lighting is on the health and safety of workers at work;

 **any standardization on “requirements or guidelines for the design and operation of artificial, biologically effective lighting at workplaces” is therefore currently neither useful nor permissible;**

- the knowledge available when the already published DIN SPEC (Technical Report) 67600, “Biologically effective illumination – Design guidelines” was written was also not sufficiently validated, making it impossible to rule out misinterpretation;
- consequently, other standards and new deliverables should not reference the DIN SPEC (Technical Report);
- the content of DIN SPEC (Technical Report) 67600 must not be used to supplement Technical Rule ASR A3.4, “Lighting”;
- health and safety experts should publish an information paper, presenting the information currently available on artificial, biologically effective lighting; and
- KAN's position on artificial, biologically effective lighting must be reviewed one year after its publication.

1.1 KAN guidance for designers of artificial, biologically effective workplace lighting

In accordance with KAN's current view, the following aspects are amongst those that need to be taken into account when designing artificial, biologically effective lighting:

- workplace lighting must comply with the rules and regulations concerning workers' health and safety;
- use of daylight at the workplace is to be given preference over use of artificial, biologically effective lighting;
- targeted use of artificial, biologically effective lighting can entail health-related and ethical risks. Any potential use should therefore be taken into account in the risk assessment. The employer is responsible for the risk assessment;
- individually controllable artificial, biologically effective lighting also poses health risks (due to misuse and incorrect assessment of one's own needs); and
- there is currently no scientifically recognized basis for evaluating and assessing such lighting in practice; for instance, with regard to how the "optimum" artificial, biologically effective lighting for individual employees, at single or group workstations, can be measured and implemented and how individual employees or groups can be protected from being influenced in ways that raise ethical concerns.

2 Artificial, biologically effective lighting

2.1 Definition and significance for humans

Light performs two functions for human beings. As well as enabling them to see, it has non-visual effects too. This non-visual biological effect of light is also defined in DIN V 5031-100 (Pre-standard), "Optical radiation physics and illuminating engineering – Part 100: Non-visual effects of ocular light on human beings – Quantities, symbols and action spectra"¹.

Daylight produces this biological effect but it can also be achieved by means of special artificial lighting. However, though artificial lighting can resemble daylight, it cannot replace daylight completely. Artificial, biologically effective lighting is always used with the aim of creating a non-visual biological effect in humans.

¹ "3.1 Biological effect of light effects that light conveyed by the eyes has on physiology and behaviour in addition to visual perception"

2.2 Significance of lighting for occupational safety and health

The role of daylight, as a natural, biologically effective form of lighting, is an important factor in ensuring the health and safety of workers at their workplaces. If the daylight available is not sufficient, artificial lighting alternatives need to be implemented wherever possible.

In view of the opportunities provided by artificial, biologically effective lighting, it is necessary to explore the possible risks and take into consideration the findings of that research.

Occupational health and safety relies on proven human factors research findings. At the moment, there is a lack of such findings with regard to the measurability of the influence of artificial, biologically effective lighting and how it works. There is no proven evidence concerning the complex interaction between qualitative and quantitative parameters such as illuminance, light spectrum, time and duration of exposure to light.

Since it is not possible to say which of the modes of effect currently being discussed are correct, there are limitations on the ability to draw reliable quantitative conclusions concerning artificial, biologically effective lighting.

One finding that is well-established, however, is that light has much more of an impact on health, performance and wellbeing than was assumed until recently. Consequently, where lighting systems with artificial, biologically effective lighting are used, the aim must always be to ensure healthy and safe workplaces. This is particularly important since lighting systems using artificial, biologically effective lighting are set to play an increasing role in the future, e.g. for workstations where there is little or no daylight.

2.3 Existing rules and specifications

2.3.1 ASR A3.4 “Lighting”

Technical Rule for Workplaces ASR A3.4, “Lighting” describes the state of the art in the installation and operation of lighting for workplaces. It does not mention new lighting technologies such as artificial, biologically effective lighting.

2.3.2 DIN SPEC (Technical Report) 67600

The Standards Committee on Lighting Technology (FNL) at the German Institute for Standardization (DIN) published the data and findings it had gathered on this topic in DIN SPEC (Technical Report) 67600, “Biologically effective illumination – Design guidelines”.

In the opinion of occupational health and safety experts, DIN SPEC (Technical Report) 67600 was not based on sufficiently validated knowledge. Misinterpretation in the application of the DIN SPEC can therefore not be ruled out. Consequently, the DIN SPEC (Technical Report) should not be referenced in standards or new deliverables. The view held by occupational health and safety experts is that non-consensus-based new deliverables such as DIN SPEC (Technical Report) 67600 must under no circumstances be used to supplement Technical Rule for Workplaces ASR A3.4, "Lighting".