Combined lighting, glare

Combined lighting

- Contemporary lighting with daylight and supplementary artificial lighting.
- It cannot yet fully replace good daylight in all respects, but it can to some extent combine the advantages of daylight (spectral composition, variability) and artificial lighting (suitable intensity).
- With a sufficient proportion of daylight, the stimulating effect of its dynamics and favorable spectral composition is applied; therefore, combined lighting is more beneficial to humans than artificial lighting alone.
- The mixing ratio of daylight and artificial lighting should be at least 1:1, with a ratio of 1:5 and less, the test results are no longer different from the results achieved with only artificial lighting.
- The intensity of the artificial lighting component should be 200-300 lx, its chromaticity temperature around 6,000 K, suitable supplementary sources of artificial lighting are de luxe type fluorescent lamps and a combination of other types, whose chromaticity temperature lies in the range of approx. 4,500 to 6,500 K, from from the point of view of color, the light bulb is therefore an unsuitable source of artificial lighting in daylight due to its low chromaticity temperature (up to 3,000 K).
- Measuring and evaluating combined lighting is not easy, it combines the daily component with constant and great variability in quantity and spectral composition, with an artificial component that is relatively constant and unchanging. There are a variety of methodologies, from simple empirical estimates to detailed calculation procedures, which are specified in relevant standards and publications.

Disturbing glare

- An unfavorable state of vision that disrupts visual well-being, makes it difficult, or it makes vision impossible and can also lead to vision disorders;
- we usually don't even realize a slight degree of glare, but it is often the cause of unnecessary eye fatigue;
- at a higher level, vision becomes strained, a feeling of uncertainty arises, eye fatigue transfers to the nervous system, the risk of injury increases, the quantity and quality of the work performed deteriorates;
- the duration of the glare is important;
- they can cause light sources directly, or their reflections from surfaces with a high reflection factor.

Division

- According to the mechanism of formation, we distinguish three types of glare:
  - **critical brightness glare (absolute glare)** , occurs when there is such a large (critical) brightness in the field of vision that the eyesight is unable to adapt to it by adaptation (direct sunlight, electric arc, etc.). The critical brightness value ranges from 200,000 to 1,000 $cd.m^{-2}$ (day – night).
  - **Transient glare** is caused by a sudden change in the brightness of the field of vision in a ratio greater than 1:100, to which the vision cannot adapt as quickly (sudden lighting, transition from a dark space to a lighted one, etc.). Visual well-being is disturbed by sudden changes in brightness from ratios of 1:10.
  - **Contrast glare (relative glare)** occurs when surfaces with different brightnesses in a ratio greater than 1:100 (bulb filament and surrounding wall) are simultaneously in the observer's field of vision. The eye is not able to adapt to such a situation and permanent glare occurs. The visual comfort is also disturbed by the brightness ratio starting from 1:10.
  - **Veil glare** occurs when there is a brighter environment between the eye and the observed object, cloudy or with a relatively fine structure such as a curtain, dirty glass, rain, fog.

We determine the **sources of glare** subjectively, by observing from the place we are investigating, in the directions of view that come into consideration for the assumed activity. In doing so, we help ourselves by monitoring visibility conditions while repeatedly covering and uncovering dazzling surfaces in the field of vision, e.g. with hands. The greater the difference in visibility that we detect in this way, the greater the glare of the assessed source. The objective measurement and assessment of glare is based on the determined brightness values and is described in another technical standard.

Visual load

Inappropriately set contrast and brightness of TV receivers and computer monitors, together with poorly chosen local or general lighting in the room (in terms of intensity or direction) can cause visual strain with a negative impact on the quality of work, premature onset of fatigue, etc. The often mentioned risks of radiation (ionizing even non-ionizing) monitors are considered only for outdated types that do not meet the requirements of low radiation given by some international standard (e.g. MPR II).

Links

Source

- BENCKO, Vladimír. *Hygiena : Učební texty k seminářům a praktickým cvičením.* 2. přepracované a doplněné

vydání edition. 2002. 205 pp. pp. 115 – 118. ISBN 80-7184-551-5.