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HUMAN CENTRIC LIGHTING

APPLICATION OF EVALUATION PARAMETERS

Lighting design: practical application of evaluation parameters for Human Centric Lighting

The “MEDI” (melanopic equivalent daylight illuminance) is used to verifiably evaluate the planning approach with Human Centric Lighting. At the start of planning the photometric targets for the MEDI have to be determined – whether an activating or non-activating light setting is desired. The application standard **DIN/TS 67600:2022-08** recommends a MEDI of at least 250 lx* for an activating effect, available ideally in the morning hours. For a non-activating effect, a MEDI of 50 lx* should not be exceeded (if this is possible in the working environment). Also, the **WELL Standard v2** recommends a MEDI of at least 250 lx* over a period of ≥ 4 hours, but starting not later than 12 o'clock noon.

Using the example of a double workstation in an office, the planning aspects and the subsequent evaluations for the MEDI* are shown.



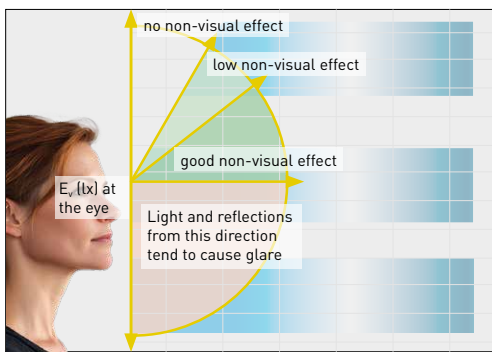
Planning aspects

- Suspended luminaires above the workstation
Colour rendering: $\text{CRI} \geq 80$
Colour temperature: TW 2700 K - 6500 K
Light distribution: direct/indirect, separately controllable
- Downlights in the peripheral area
Colour rendering: $\text{CRI} \geq 80$
Colour temperature: TW 2700 K - 6500 K
Light distribution: direct
- Light management

*Based on a 32-year-old person. Measuring level at the eye.



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Background

EN 12464-1:2022-11 requires a minimum value for horizontal illuminance E_h of 500 lx, and describes the situational requirements for a possible increase in illuminance E_h to 1,000 lx in the work area. An HCL lighting concept with Tunable White luminaires and light management is characterised by light settings with adjustable, vertical illuminances E_v at the eye. The melanopic effect can also be influenced via the coordinated most similar colour temperature.

Calculation

For converting to the melanopic equivalent daylight illuminance (MEDI), the melanopic daylight efficacy ratio (MDER) of the light source and the planned value of vertical illuminance E_v at the eye (also see Fig. 2) are required. The conversion factor MDER for the suitable most similar colour temperature of the luminaire can be determined from the "[Human Centric Lighting evaluation parameters](#)" table.

Formula: **MEDI* = MDER x E_v**

Planning note

The vertical illuminance E_v is a calculation result from established lighting design tools. At the present time, the software versions available on the market do not provide a MEDI value as a result. This means the MEDI has to be calculated using the formula above.

Light setting	Photometric illuminance	Direct component of suspended luminaire	Indirect component of suspended luminaire	Direct component of downlight	Photometric illuminance	Colour temperature	MDER	MEDI*
	E_h (0.75 m) (work area)	Dimming level	Dimming level	Dimming level	E_v (1.20 m) (eye level)			
Office low activating	500lx	100%	0%	30%	200 lx	3,000 K	0.48	96 lx
Office activating	750lx	75%	75%	100%	300 lx	6,000 K	0.83	250lx
Office activating	1,000lx	100%	100%	100%	400 lx	6,000 K	0.83	332lx
Private area non-activating	≤ 100 lx (living room)	-/-	-/-	25%	30 lx	2,700 K	0.41	12lx

In this planning example, the downlights in the peripheral area only have a low melanopic effect because of their small light emission surface and low vertical luminous flux component.

*Based on a 32-year-old person. Measuring level at the eye.



**Light setting
Office low activating**

- Suspended luminaire dimming level direct 100 % (0 % indirect)
- Downlight dimming level direct 30 %
- Work area $E_h \approx 500$ lx
- Light colour warm white
- Colour temperature: 3000 K
- MDER = 0.48
- $E_v = 200$ lx
- MEDI = 96 lx



**Light setting
Office activating**

- Suspended luminaire dimming level direct + indirect 100 %
- Downlight dimming level direct 100 %
- Work area $E_h \approx 1,000$ lx
- Light colour daylight white
- Colour temperature: 6000 K
- MDER = 0.83
- $E_v = 400$ lx
- MEDI = 332 lx

- **DIN/TS 67600:2022-08** Complementary criteria for lighting design and lighting application with regard to non-visual effects of light
- **EN 12464-1:2021-11** Light and lighting – Lighting of indoor work places
- **International WELL Building Institute (IWBI)** WELL Building Standard v2-2024

*Based on a 32-year-old person. Measuring level at the eye.