

## Fattori di efficacia melanopica dei LED

Per convertire quantificazioni fotopiche (visive) in dati melanopici (biologici) (conf. CIE S 026/E:2018, DIN SPEC 5031-100).

CRI	Temperatura di colore correlata*	Flusso luminoso apparecchio	MNER	MDER	MEER
>90	2700 K	3800 lm	1,04	0,48	0,53
	3000 K	3800 lm	1,05	0,55	0,61
	3500 K	3800 lm	1,04	0,65	0,71
	4000 K	3800 lm	1,02	0,72	0,80
	4500 K	3800 lm	1,00	0,78	0,86
	5000 K	3800 lm	0,99	0,83	0,92
	5700 K	3800 lm	0,97	0,90	0,99
	6500 K	3800 lm	0,96	0,96	1,06

**CRI:** Indice di resa cromatica superiore a

**Temperatura di colore correlata\*:** Valori della temperatura di colore secondo ANSI

**Flusso luminoso apparecchio:** Flusso luminoso nominale apparecchi

**MNER:** Melanopic Natural Efficacy Ratio

± mv, mel, nat (fattore di conversione relativo all'illuminante di riferimento naturale, simile al calcolo della resa cromatica, a parità di temperatura di colore (CCT))

**MDER:** Melanopic Daylight Efficacy Ratio, CIE S 026/E:2018

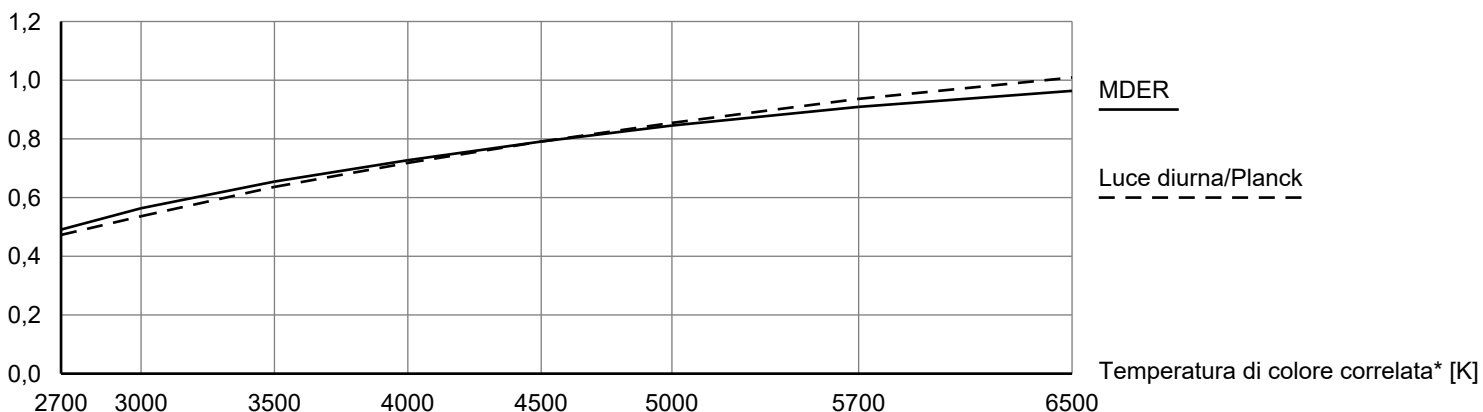
± mv, mel, D65 (DIN SPEC 5031-100, fattore di conversione relativo all'illuminante D65, per calcolare l'illuminamento equivalente alla luce diurna melanopica)

**MEER:** Rapporto melanopico di pari energia, CIE S 026 / E: 2018

± R (equivalente Melanopic Lux metrico, rapporto melanopico) adatto per calcoli secondo WELL Building Standard v2 (L03)

**Luce diurna/Planck:** Il valore di riferimento naturale è luce diurna sopra i 5000K, spettro di Planck al di sotto.

MDER



### Nota per il progettista illuminotecnico:

Vedi allegato sul calcolo degli effetti di illuminazione melanopica. In alternativa rivolgersi ai nostri progettisti di soluzioni illuminotecniche.

Allegato: [https://www.thornlighting.com/PDB/Teaser/EN/TLG\\_Melanopic-Datasheet-Supplement.pdf](https://www.thornlighting.com/PDB/Teaser/EN/TLG_Melanopic-Datasheet-Supplement.pdf)

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## Notes regarding the conversion of visual evaluation variables into biological evaluation variables

The conversion factors specified in the “Melanopic Data Sheet” can be used to convert the results of a photopic light calculation or measurement into melanopic evaluation variables.



Photopic (visual) evaluation



Melanopic (biological) evaluation

- 1 Reception area of the vertical illuminance at the eye of the observer, relevant for melanopic evaluation
- 2 Light from light source **photopically evaluated** with standard measuring and planning tools
- 3 Light from light source **melanopically evaluated** with formula (photopic value multiplied by factor from Zumtobel data sheet = melanopic value)

## Notes regarding melanopic light planning

The specified “melanopic action factors” enable the light planner to perform calculations to determine biological effectiveness (in accordance with CIE S 026/E:2018, DIN SPEC 5031-100, DIN SPEC 67600 and [WELL Building Standard](#)). With regard to the aspects of “Human Centric Lighting” and “Human Centred Design”, these extended planning parameters are attributed increasing importance for optimised light quality and well-being.

The luminaire and its spectrum contribute to the biological effect, but a holistic approach is required: *Integrative, holistic planning includes the application and effects of light in the planning process from the outset and, amongst other things, helps to implement energy-efficient solutions for biologically effective light through suitable use of daylight.\**

A holistic planning should take the following aspects into account: \*, \*\*, \*\*\*

- Luminous intensity (illuminance)
- Changes in the spectrum during transmission
- Changes in the spectrum during reflection
- Changes in the spectrum through absorption
- Area and room angle (geometric arrangement of the light)
- Light direction (geometric arrangement of the light)
- Daytime adapted light
- Season adapted light
- Duration of light exposure
- Spectral and spatial distribution of light over time
- Rapid light changes
- Luminous intensity (illuminance) at other times
- Correction factor for age with melanopic effects of light
- Correction factor for age-dependent reduction of transmission by the eyes
- Correction factor for age-dependent pupil constriction

Another source for planning all aspects of “Human Centric Lighting” is the [licht.wissen 21](#) Guide to Human Centric Lighting (HCL), available free of charge at licht.de.

\*DIN SPEC 67600, \*\*DIN SPEC 5031-100, \*\*\*No claim to completeness