



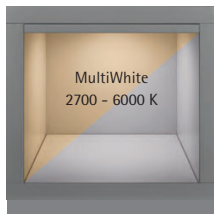
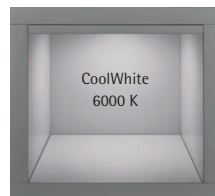
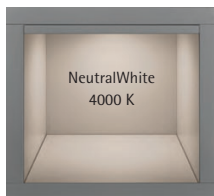
Illuminating facts about light

We bring light into the darkness

Lux, lumen and kelvin, warm white, cool white and neutral white: although the terminology of lighting systems is all around us, it is not always clear to us. We would like to bring light into the dark with a few explanations.

► Light colour and colour temperature

White light is composed of the entire colour spectrum, i.e. it is the sum of all light colours. If the proportion of red in the light dominates the light appears warm, and cooler if it contains more blue. This colour impression that a light source gives us is called the light colour. Colour temperature is measured in Kelvin (K). This only provides information on the visual colour impression; it does not say anything about the thermal value of the light. The annealing colours of a black test piece heated to the appropriate temperature serve as a reference for this.



The colour designations are not standardised and do not designate specific light colours, but merely colour ranges.

► The classifications

XW XtraWarmWhite
2500 – 2800 K
Illumination of e.g. baked goods

WW WarmWhite
2900 – 3300 K
Comfortable, calming

NW NeutralWhite
4000 – 4500 K
Objective

CW CoolWhite
5000 – 6500 K
Daylight-like, technical, stimulating

MW MultiWhite 2500 – 6500 K
Adjustable white
Cosy to daylight-like

► Colour rendering

The colour rendering of light determines whether the light makes the colours appear dull or bright. It is important for good visual results and pleasant viewing experiences.

Light that contains all spectral colours – such as day light – makes the colours of objects look natural. Colour rendering is neutral, and therefore particularly favourable for judging colours.

The colours of objects tend to look unnatural in light with an unbalanced colour spectrum.

The quality of the colour rendering of a light source is assessed by the colour rendering index (CRI). It is derived from common test colours and indicates how naturally colours are rendered. Depending on the visual task, the appropriate colour rendition should be chosen. To ensure a relaxed and positive visual experience, the colour rendering index should not be less than 80.

Many customers attach great importance to high-quality furnishings and fittings for their homes and living environments. A lot of money and passion is invested in the ambience. But only the optimal lighting can bring their interior design perfectly to the fore.

Only an indirect relationship exists between light colour temperature and colour rendition. The currently best method uses the principle of "luminescence conversion" and is used both for LED and fluorescent lamps. In this method the original blue LED light is transformed into white light by a very thin layer of phosphor material. Currently, CRI values of up to over 90 can be achieved with this method. This method currently provides the best price/performance ratio for high quality lighting solutions and is therefore preferred by HALEMEIER.



► **Luminous flux**

Luminous flux describes the luminous efficiency of a light source and is expressed in lumen (Lm).



► **Light distribution diagrams**

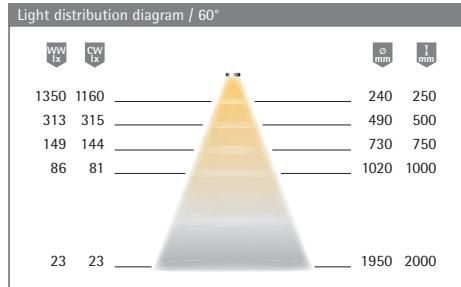
The light distribution diagrams shown in the catalogue help to select the right luminaire.

The diagrams illustrate:

1. the illuminance at a distance from the luminaire
2. the light distribution area
3. the half value angle

► **Luminous intensity**

Light intensity (illuminance) is probably the term most frequently used in lighting and defines the incidence of luminous flux on a defined surface, measured in lux (lx).



Why do we give the illuminance in lux, and not in lumens or watts?

The wattage of a luminaire says practically nothing about what kind of lighting effect the luminaire produces. All we learn by specifying watts is how much power a light consumes while it is operating. Or put simply: what it costs us to turn them on. In other words, watts are important for assessing the efficiency of a luminaire and for selecting the appropriate electronic ballast. However, they say nothing about the brightness of this light.

The illuminance in lux specified for the luminaire, on the other hand, makes it easy to assess what effect – functional, decorative, accentuating or orienting – can be achieved.

Brightness is a generic term for subjective impressions and objective measured quantities for the visual perception of – visible – light. This means that we all have a different "need" for brightness. As a rule, older people, for example, need more light than young people in order to have the same impression of brightness.

When planning, it should also be taken into account that dark surfaces "swallow" more light than light surfaces. Therefore: The lower the reflectance and the more difficult the visual task, the higher the illuminance needs to be.

Some examples of degrees of reflection:

- White walls up to 85 percent
- Maple and birch up to 60 percent
- Light oak up to 35 percent
- Red bricks up to 25 percent
- Dark oak only up to 15 percent



► **ENEC**
European mark of conformity: Confirmed standards conformity for electrical products through national certification bodies.



► **VDE-GS mark**
German mark for appliances as technical equipment according to the Appliance Safety Act GSG.



► **EMC**
Approval mark of the VDE, confirming compliance with the law on electromagnetic compatibility.



► **CE**
The CE mark certifies among other things compliance with the Low Voltage Directive and the EMC Directive by the manufacturer or importer.



► **F mark**
In the past, luminaires suitable for direct mounting on or against normally flammable materials bore the F mark. This is no longer required by current standardisation status, but assumed. Only deviations are marked.



► **MM mark**
Lights and transformers suitable for installing in or on furniture which are made from materials with unknown flammability properties.



► **Temperature-protected electronic transformer**
Converter is protected against overtemperature and switches off in the event of a fault. The value in the triangle shows the maximum housing temperature in the event of a fault.



► **Short-circuit-proof safety transformer**
Converter is protected against short circuit and switches in the event of a fault.



► **Independent electronic transformer**



► **Maximum permissible ambient temperature**
This is the temperature level up to which no components are thermally overloaded.



► **Temperature reference point**
Denotes the temperature reference point on the housing surface which, if exceeded, reduces useful life.



► **Protective extra-low voltage**
Safety Extra Low Voltage



► **Safety class 1 – Devices with earth conductor connection**
Equipment in which protection against electrical shock does not only rely on basic insulation. An additional measure of protection is given by connecting those conductive components to the protective earth conduct or in the building wiring that are otherwise capable of assuming hazardous voltages if the basic insulation fails.



► **Protection class 2 – devices without protective earth connection**
Equipment where the protection against electric shock is not only based on the basic insulation, but where additional safety measures for double insulation or reinforced insulation are present. There is no facility for connection to protective earth conductors.



► **Protection class 3 – Devices with protective extra-low voltages**
Equipment with protection against electric shock on protective extra-low voltage and in which voltages higher than the protective extra-low voltage are not generated – For voltages below 25 volts AC or 60 volts DC, protection against contact can be completely dispensed with.

IP codes

► **Protection against foreign bodies / water**

- IP 20 Protection against medium-sized foreign bodies / no protection against water
- IP 21 Protection against medium-sized foreign bodies / protection against water
- IP 40 Protection against granular foreign bodies / no protection against water
- IP 44 Protection against granular foreign bodies / protection against splashing water from all directions
- IP 65 No ingress of dust / protection against water jets



Use only in dry rooms

► **The following marks confirm compliance with North American standards**



QPS test mark for Canada and USA



Test mark of the UL Institute



Test mark of the ETL Institute



Declaration of conformity for products in the United Kingdom



Zigbee is the complete solution for the majority of major smart home solutions. Halemeier is a member of the Zigbee Alliance