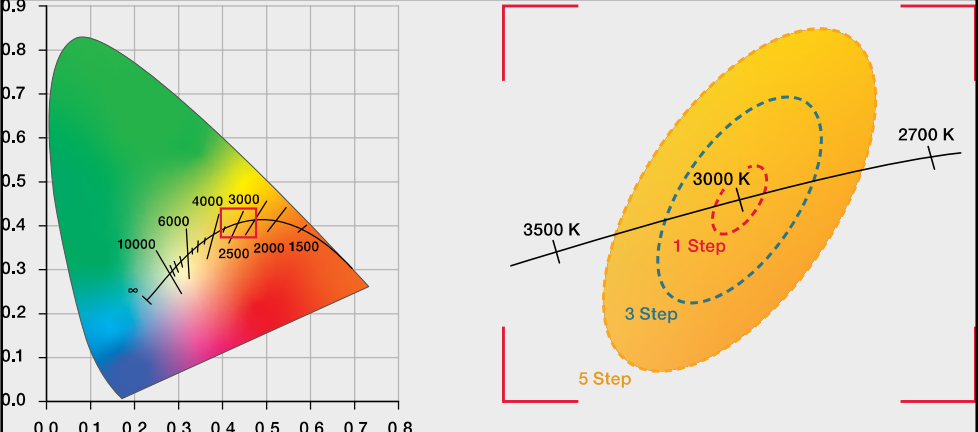


Technical terms

Technical terms

| <p>Refraction angle</p> | <p>The refraction angle (beam angle) describes the angle between two imagined straight lines in a plane through the visual beam axis, whereby these straight lines go through the center of the front of the lamp and through the points at which the illuminance is 50% of the illuminance on the visual beam axis.</p> | | | | | | | | | | | | | | |
|--|--|------|------------|---|--|---|---|---|---|---|--------------------------------|---|--|----|---|
| <p>Illuminance</p> | <p>The illuminance is the luminous flux (lm) in relation to a surface (m²) and it is indicated in Lux (lx). It is used to measure the brightness with which a surface is illuminated.</p> | | | | | | | | | | | | | | |
| <p>Binning</p> | <p>During industrial manufacture, LEDs differ from each other with regard to color, luminous flux (brightness) and forward voltage. In order to achieve consistent light quality with the same brightness level and a uniform light color, they are therefore sorted according to color, luminous flux and forward voltage and separated into bins ("containers") during manufacturing. This sorting process is known as Binning. Häfele exclusively uses bins with a high degree of brightness in order to achieve high efficiency.</p> | | | | | | | | | | | | | | |
| <p>Bluetooth® Mesh</p> | <p>Network technology which was introduced in 2017, based on Bluetooth® Low Energy, in which all components (controls, devices) form a joint network, which is ideal for controlling lights. Häfele Connect Mesh uses this technology.</p> | | | | | | | | | | | | | | |
| <p>Energy efficiency class</p> | <p>The energy efficiency class provides information about the relevant energy consumption. Lamps and lights are categorized in classes E to A++. LED lights achieve the highest classes A to A++.</p> | | | | | | | | | | | | | | |
| <p>Color temperature and light color</p> | <p>The color temperature is a specification of the color appearance of a white light source and is measured in Kelvin (K). The lower the color temperature, the warmer the light color; the higher the color temperature, the cooler the light color. White light sources with a color temperature below 3400 K are considered "warm white" by Häfele, white light sources with a color temperature between 3400 K and 5700 K are considered "cool white". White light sources above 5700 K are referred to as "daylight white".</p> | | | | | | | | | | | | | | |
| <p>Color consistency/ color differences</p> | <div style="display: flex; align-items: flex-start;">  </div> <p>Color differences are specified in stages, so called "MacAdams Ellipses" or "SDCM" (Standard Deviation of Color Matching). Häfele uses 3 SDCM binnings for its LED products. This is a good value, because it is statistically unlikely that LEDs with a maximum color difference will be next to each other on the strip light or in the light and that the color difference is visible. In its ErP directive, the EU Commission stipulates that 6 SDCMs may not be exceeded for LED products.</p> <table border="1" data-bbox="483 1562 1398 1791"> <thead> <tr> <th>SDCM</th> <th>Visibility</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Only people with extremely good vision can see the most minimal color differences.</td> </tr> <tr> <td>2</td> <td>Most minimal color differences are visible.</td> </tr> <tr> <td>3</td> <td>Very small color differences are visible.</td> </tr> <tr> <td>4</td> <td>Color differences are visible.</td> </tr> <tr> <td>5</td> <td>Significant color differences are visible.</td> </tr> <tr> <td>>5</td> <td>Very clear color differences are visible.</td> </tr> </tbody> </table> | SDCM | Visibility | 1 | Only people with extremely good vision can see the most minimal color differences. | 2 | Most minimal color differences are visible. | 3 | Very small color differences are visible. | 4 | Color differences are visible. | 5 | Significant color differences are visible. | >5 | Very clear color differences are visible. |
| SDCM | Visibility | | | | | | | | | | | | | | |
| 1 | Only people with extremely good vision can see the most minimal color differences. | | | | | | | | | | | | | | |
| 2 | Most minimal color differences are visible. | | | | | | | | | | | | | | |
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| 5 | Significant color differences are visible. | | | | | | | | | | | | | | |
| >5 | Very clear color differences are visible. | | | | | | | | | | | | | | |
| <p>Color rendering index CRI</p> | <p>The color rendering index is a parameter that can be used to compare the color rendering quality of light sources at the same color temperature. The higher the value, the better the color rendering. A value of 100 corresponds to the color rendering of sunlight.</p> | | | | | | | | | | | | | | |
| <p>Weighted energy consumption</p> | <p>The weighted energy consumption is rounded to two decimal places in kilowatt hours in relation to 1,000 hours of use. It applies to operation of the LED with an external driver. The calculation and publication of this value is defined by EU ordinance No. 874/2012.</p> | | | | | | | | | | | | | | |

Technical terms

| Constant current technology | The same current flows through each LED. That means that the brightness of all LEDs is the same, and a drop in luminous flux is prevented. This increases the maximum visual length of the strip lights. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------------|---|------------------------|--|------------------------|------------------------------|--------|-------|----|--------|-----------|-------|----|--------|----------|-------|----|--------|-------|-------|----|--------|------------|-------|----|--------|------|-------|----|--------|
| Life time | Specified in operating hours. The life time mainly depends on the warming of the products. The hotter the environment, the shorter the life time. The replacement rate in years is calculated from the total life time and the average operating time per annum. The following table can be used as a planning aid. The specified life time relates to L70/B50. <table border="1" data-bbox="493 529 1395 781"> <thead> <tr> <th>Indoor use</th> <th>Annual operating time (EN 15193) hours</th> <th>Replacement rate Years</th> <th>Life time installation Hours</th> </tr> </thead> <tbody> <tr> <td>Office</td> <td>2,500</td> <td>20</td> <td>50,000</td> </tr> <tr> <td>Education</td> <td>2,000</td> <td>25</td> <td>50,000</td> </tr> <tr> <td>Hospital</td> <td>5,000</td> <td>10</td> <td>50,000</td> </tr> <tr> <td>Hotel</td> <td>5,000</td> <td>10</td> <td>50,000</td> </tr> <tr> <td>Restaurant</td> <td>2,500</td> <td>10</td> <td>25,000</td> </tr> <tr> <td>Shop</td> <td>5,000</td> <td>10</td> <td>50,000</td> </tr> </tbody> </table> | Indoor use | Annual operating time (EN 15193) hours | Replacement rate Years | Life time installation Hours | Office | 2,500 | 20 | 50,000 | Education | 2,000 | 25 | 50,000 | Hospital | 5,000 | 10 | 50,000 | Hotel | 5,000 | 10 | 50,000 | Restaurant | 2,500 | 10 | 25,000 | Shop | 5,000 | 10 | 50,000 |
| Indoor use | Annual operating time (EN 15193) hours | Replacement rate Years | Life time installation Hours | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Office | 2,500 | 20 | 50,000 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Education | 2,000 | 25 | 50,000 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Hospital | 5,000 | 10 | 50,000 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Hotel | 5,000 | 10 | 50,000 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Restaurant | 2,500 | 10 | 25,000 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Shop | 5,000 | 10 | 50,000 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Life time L80/B10 | L80 is the time after which the LED is still emitting 80% of its original light. B10 means that 10% of the LEDs may have less than 80% of the original light output. Häfele tests all LEDs it uses in accordance with the LM-80 standard. LM-80 is a standardized testing method, which allows products to bear the EPA's (Environmental Protection Agency) Energy Star. The test is a manufacturer-independent comparison of LEDs. During the test the luminous flux (Lumen maintenance) of an LED is tested at three different temperatures for a minimum of 6,000 hours. Then the life time L80 is calculated by means of extrapolation. The extrapolation procedure is described in regulation IES TM-21. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LED | A light-emitting diode (LED) is a semi-conductor element that emits light when electricity passes through it. This semi-conductor element consists of a crystal that is attached to a metal base, and both are encapsulated in protective plastic. LEDs are mostly based on inorganic, i.e. non-carbon based materials. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Luminous efficacy | The luminous efficacy is the ratio of the luminous flux and the wattage absorbed. It is used to measure the operating efficiency of the light source. It is indicated in Lumens per Watt (lm/W). | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Luminous flux | It is indicated in Lumen (lm). The luminous flux indicates the light output, i.e. the quantity of light a source emits. The value may be subject to measurement and production-related fluctuations of ±10%. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Drop in luminous flux | The brightness of the LEDs on LED strip lights decreases with the length of the strip light due to the increasing resistance of the copper line. A drop in luminous flux from the first to the last LED of up to 30% is imperceptible to the human eye. That's why Häfele specifies a maximum strip light length for this visual value. Generally, it is possible to operate strip lights with longer lengths, but a difference in brightness will be visible. Exception: The LEDs of the strip lights with constant current technology (LED 2077/3050/3051/3052) always have the same brightness. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Max. strip light length | Visual value Strip light length with an imperceptible drop in luminous flux of max. 30%. Wattage-dependent value Strip light length = output power of driver / wattage of the strip light per meter. If the wattage-dependent value is greater than the visual value, a difference in brightness will be perceivable. Exception: The LEDs of the strip lights with constant current technology (LED 2077/3050/3051/3052) always have the same brightness. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Multi-white | The light color of shades of white can be changed as required with Häfele Connect Mesh, e.g. from warm white to cool white. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RGB | RGB is the abbreviation for red, green and blue. In combination with Häfele Connect Mesh, almost any color combination can be created from these three primary colors. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RoHS – Lead in Loox products | Loox Products by Häfele are lead-free and adhere to the RoHS guidelines. RoHS is part of CE conformity. All Loox products are CE compliant. Häfele does not advertise the CE conformity in its catalogs, since only CE compliant products are allowed to be offered. The declaration of conformity is available online at www.hafele.com | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Transmittance | Ratio of transmitted light to incidental light. An ideal transparent body would have a transmittance of 100%. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |