

Measured light vs. perceived light

The human eye responds to low light levels by enlarging the pupil, allowing more light to enter the eye. This response results in a difference between measured and perceived light levels.

A lamp that is dimmed to 10% of its maximum measured light output is perceived as being dimmed to only 32%. Likewise, a lamp dimmed to 1% is perceived to be at 10%.

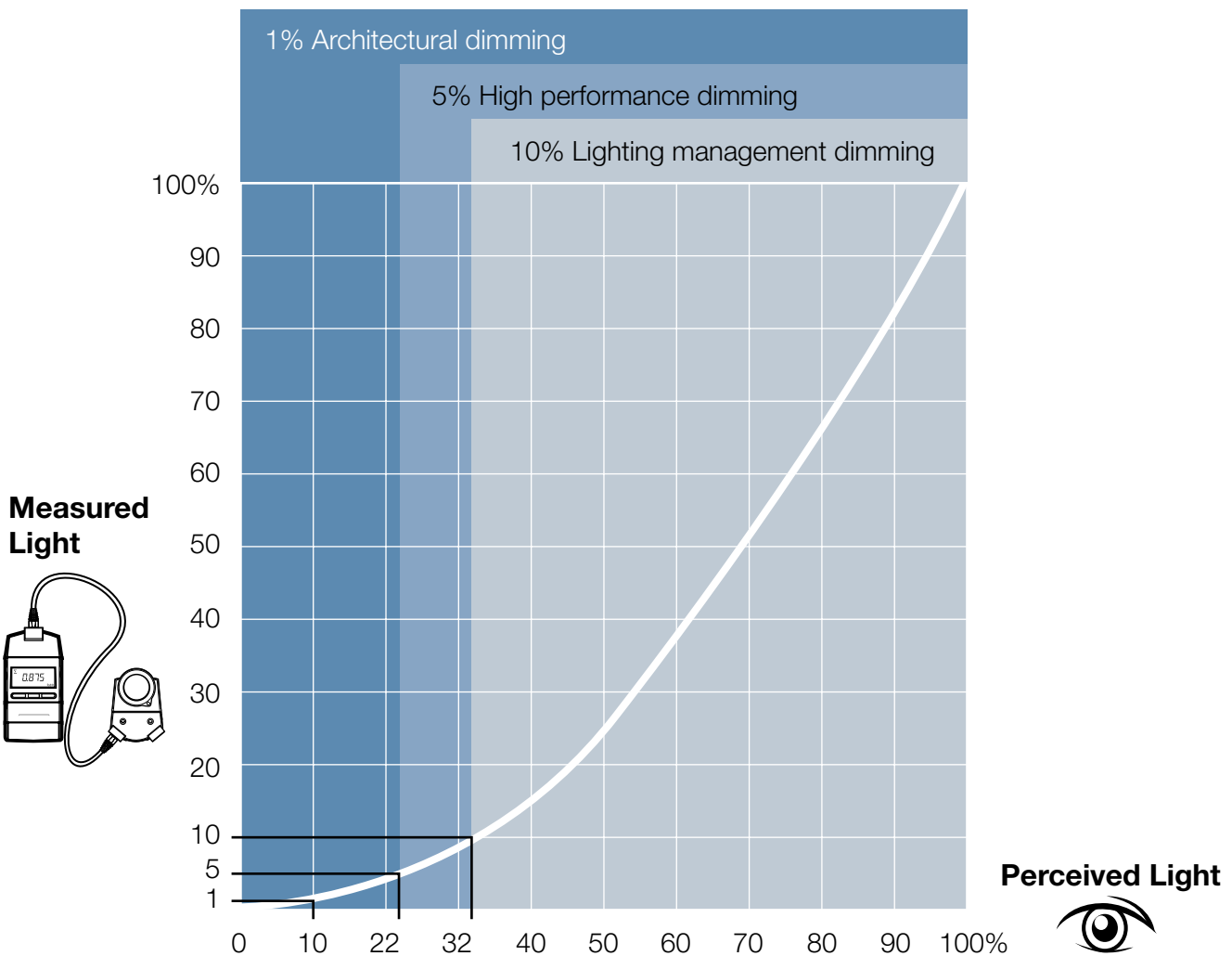
Design example

At full brightness, the measured light in a space is 60 foot-candles. At the lowest dimmed level, 10% perceived light is desired.

1% measured light (0.6 fcd) is perceived as 10% (desired result)

5% measured light (3 fcd) is perceived as 22% (2x brighter than desired)

10% measured light (6 fcd) is perceived as 32% (3x brighter than desired)



$$\text{Formula: Perceived Light (\%)} = 100 \times \sqrt{\frac{\text{Measured Light (\%)}}{100}}$$

Source: IESNA Lighting Handbook, 9th Edition, (New York; IESNA, 2000), 27-4.