Adapt the illumination level to the actual requirements

The light output does not match the requirements for the specific type of room usage. The room is lit too brightly (overlit), too dimly (underlit), or is lit inefficiently.

Action
Adjust the light output to match the individual type of use by selectively removing lights in overlit zones or setting the basic illumination to a lower level. Install presence and motion sensors where required.

Requirement
The illumination level or the specific electrical power of the lighting is higher than the levels specified by SIA 387-4 for the type of room usage concerned.

Demand-oriented lighting adapted to usage will cut electricity costs by 20 to 30 percent.

What to do
1. Determine the illumination level (setpoint value)
Using the SIA table (see overleaf), determine the necessary illumination level for the room.

2. Determine the electrical power (setpoint)
Using the SIA table (see overleaf), determine the recommended (maximum) electrical power (W/m^2) for the room.

3. Measure the current illumination level (actual value)
Measure the effective illumination level (lux) in the room. You need a lux meter to do this.

4. Calculate the current electrical power (actual value)
Based on the installed lighting (luminaires, lighting equipment), calculate the installed electrical power per square metre (W/m^2).

5. Compare the actual values to the setpoint values
If there are discrepancies between the actual values and the setpoint values, adapt the lighting (see overleaf).

Costs – effort
Internal labour: approx. 1 hour per room

Material costs:
– Lux meter, approx. CHF 100
– Motion sensor, approx. CHF 50 to CHF 100
– Presence sensor, approx. CHF 100 to CHF 150

Please note!
– If you have replaced an old lighting system (e.g. FL tubes) with a new system (LED), a 1:1 replacement may result in overlighting because the luminous efficacy of LEDs is greater.
– Retrofittable lighting equipment with integrated presence and daylight sensors is available; depending on the preset, it can dim the light or turn it off entirely.

swissenergy

Additional explanations

Determine the specific power

You can determine the currently installed electrical power per square metre (W/m^2) as follows:

1. Calculate the total power of the lighting

- Count the luminaires in the room.
- Count the light sources (FL tubes, LED lamps, incandescent bulbs, etc.) per luminaire.
- Determine the electrical power (W) of the light sources.
- You can now calculate the total power of the lighting. Example: 15 luminaires with 2 FL tubes each at 36 W = 1080 W

2. Determine the room's area

Example: 8 m (length) x 6 m (width) = 48 m^2

3. Calculate the specific power (W/m^2)

Example: 1080 W/48 m^2 = 22,5 W/m^2

Assess the situation

A: The room is overlit.

The specific power (W/m^2) and the illumination levels (lux) are currently too high.

- Either dim the luminaires or
- Reduce the number of luminaires. For example: remove every second or third luminaire.

B: The room is underlit.

The specific power (W/m^2) and the illumination levels (lux) are currently too low.

- Use more efficient light sources (e.g. LED tubes instead of FL tubes) or
- Increase the number of luminaires.

C: The room is lit inefficiently.

The illumination level is correct but the specific power of the lighting (W/m^2) is too high.

- Consider changing to a more efficient light source, or
- Optimise the lighting control by using presence, motion or daylight sensors to ensure that the lighting operates only when people are present or when insufficient natural light is available.

Assessment

SIA standard 387/4:2017: Electricity demand for lighting provides the basic principles for assessing the illumination level and specific power consumption. This standard also describes the maximum permitted specific power (e.g. 6,6 W/m^2) and the value for a very good lighting system (e.g. 4,6 W/m^2).

Room usage	Illumination level, lux	Specific power, W/m^2	Full-load hours, h/a
Reception	300	4,3–6,6	3150–4100
Individual/group office	500	8,1–12,5	350–1400
Open-plan office	500	6,4–9,8	1100–1950
Classroom	500	7,2–11	450–1300
Lecture hall	500	6,4–9,8	950–1700
Gymnasium, sports hall	200–300	7,3–11,3	1250–2250
Locker room	200	3,7–5,7	150–850
Sales area	300	7,8–12	4000
Hospital room with one or more beds	100	4,4–6,8	800–1550
Hospital ward	300	8,1–12,5	4550–5750
Laboratory rooms	500	8,3–12,8	400–1350
Kitchen	500	12,2–18,8	2100–2650
Restaurant	200	3,8–5,9	1600–2650
Canteen, refectory	200	2,3–3,5	900–1500
Circulation/traffic area	200	2,3–3,5	250–1400
Staircase	150	2,3–3,5	250–1400
Parking garage	75	0,9–1,4	650–1600
Warehouse/storage hall	300	4,7–7,3	450–1450

The full-load hours listed in the table can be taken as the basis for assessing the period for which the lighting is turned on.

Additional information

- Standard SIA 387/4: 2017, Electricity in buildings – lighting: calculation and requirements
- Technical book: "Light in the home – energy-efficient lighting", www.faktor.ch
- Efficient lighting for small businesses