

# Zoning of automatic lighting controls in buildings

## Introduction

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Zoning in heating, ventilation, and air-conditioning (HVAC) systems is largely constrained by physical boundaries such as walls and compartments. As a result, in open-plan spaces, HVAC effects are not localised but tend to diffuse across the entire area. This limitation does not apply to lighting, where sub-zones within open-plan spaces can operate effectively and independently. Consequently, zoning for HVAC and lighting are fundamentally different: lighting can be zoned at a much more localised level, positively impacting energy use and occupant comfort. With this paper, we aim to share our recommendations regarding the zoning of automatic lighting controls in buildings.

## Our recommendation

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From both a technical and economic perspective, modern lighting control systems are fully capable of managing small, highly granular zones, including at the level of individual workstations. Given that the EPBD mandates the use of automatic lighting controls, implementing systems that respond to occupant needs generally entails minimal or no additional cost. Accordingly, “suitably zoned” should be interpreted as zoning that is tailored to the needs and activities of occupants, rather than being constrained by alignment with broader building system zoning.

This occupant-centric approach to lighting zoning enhances energy efficiency while simultaneously supporting user comfort, safety, and productivity, and should therefore be regarded as a key design principle for contemporary building lighting systems.

## Zoning of automatic lighting controls

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The EPBD (EU/2024/1275) stipulates in Article 13(12) that “automatic lighting controls shall be suitably zoned and capable of occupancy detection.” But what does “suitably zoned” mean? To clarify its implications, it is first necessary to define what constitutes a *zone* in the context of built-in lighting. A zone is to be understood as a defined area within a building in which luminaires are grouped and controlled collectively, allowing lighting levels to be managed efficiently.

With the concept of a zone now clarified, the next step is to interpret what is meant by “suitably zoned.” According to the EPBD, zoning should “be aligned with zoning in BACS (Building Automation and Control Systems) and other technical building systems.” In

practice, BACS zoning typically encompasses relatively large building areas, such as entire floors. While this approach establishes a baseline level of energy efficiency - by ensuring that lighting in these large zones is switched off when unoccupied - it may not fully optimize energy savings.

To achieve greater energy efficiency, zoning should be further refined. Subdividing large areas into smaller zones enables lighting systems to dim or switch off portions of space that are not in use within a broader zone. For example, luminaires located near windows can be adjusted in response to available daylight. This approach maximizes energy savings while maintaining appropriate light levels and enhances efficiency without compromising functionality.

It is important to recognise that lighting serves a purpose beyond energy consumption; its primary function is to provide us with appropriate lighting for specific activities and locations. Lighting systems are therefore designed to support a wide range of applications, and their zoning must be responsive to the needs of occupants. Achieving this level of flexibility typically requires smaller, more granular zones. Consequently, the term “suitably zoned” should not be interpreted solely by alignment with BACS or other technical building systems, but rather in relation to the activities performed and the requirements of building users. From this perspective, lighting zoning becomes a key component of Indoor Environmental Quality (IEQ) and should be treated as an IEQ parameter in its own right.

Examples of use cases for occupant-focused zoning include:

- Dimming or switching off lighting in vacant areas, while maintaining dimmed lighting in unoccupied portions of open-plan offices to avoid feelings of insecurity when only a few workstations are in use.
- Adjusting light levels in areas adjacent to windows in response to available daylight.
- Maintaining corridor lighting when adjacent offices are occupied.
- Dynamically adjusting lighting intensity and colour temperature to mimic daylight and support the human circadian rhythm.

## Contact

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