

# Lighting and Visual Comfort

(Version 2.0, December 2020)

Lighting and visual comfort is very important to people’s health and wellbeing and good daylight in learning spaces contributes to improved learning performance. This overview provides a summary of the Ministry’s new lighting requirements for creating quality learning environments that are fit for purpose. The requirements form part of the Ministry’s Designing Quality Learning Spaces (DQLS) suite of documents. This overview covers the target audience, mandatory requirements, and key design concepts.

The target audience for the new lighting requirements is designers and engineers involved in the design of the Ministry’s school buildings.

It is to be used for new builds, including extensions, pre-fabricated and any new contracts for modular buildings, and refurbishment of existing school buildings, including significant alterations.

It covers four key areas:

- The importance of good lighting for learning
- Mandatory daylighting and electric lighting requirements (refer to the tables below)
- Design guidance and recommendations for specialist learning and ancillary spaces
- Lighting verification methodologies

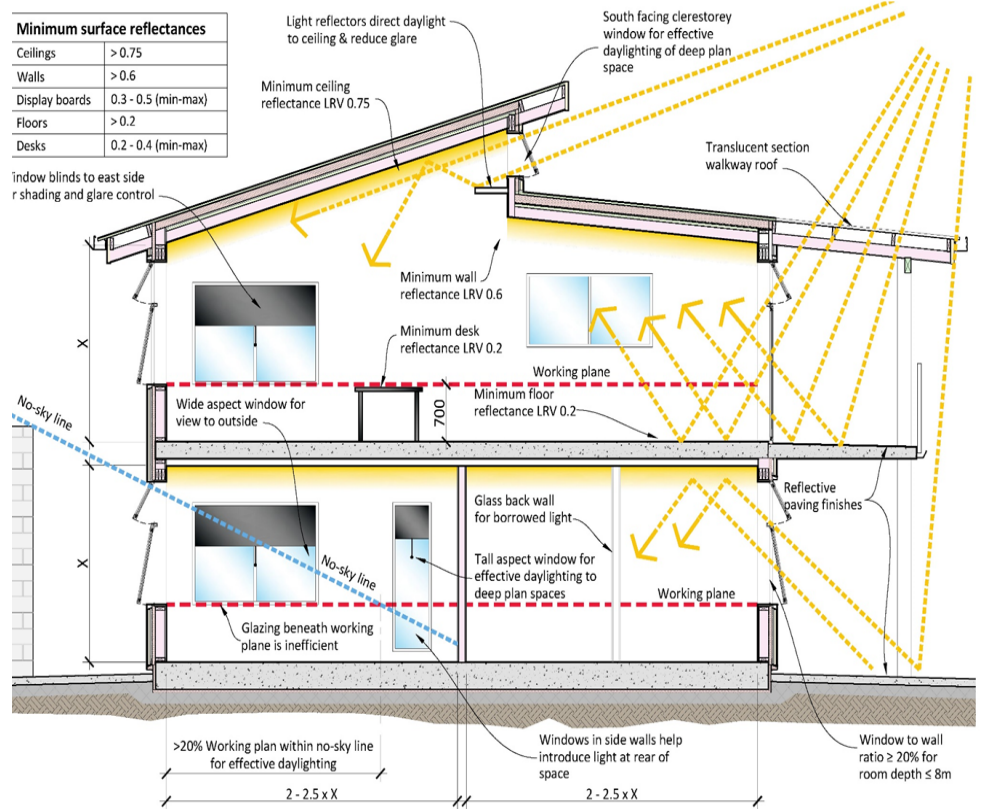


Figure 1: Summary of Daylighting Strategies

Description	Daylighting Mandatory Requirements (New Build and Refurbishments)
<b>General Scope</b>	<ul style="list-style-type: none"> <li>• Daylighting must be the principal source of lighting in learning spaces, supplemented by electric light when daylight is insufficient to meet the specified illuminance levels.</li> </ul>
<b>Simple Building Forms</b>	<ul style="list-style-type: none"> <li>• Design teams must use the <a href="#">Daylight Calculator Tool</a> to demonstrate compliance with the four-step daylight sequence in DQLS – Lighting.</li> </ul>
<b>Complex Building Forms</b>	<ul style="list-style-type: none"> <li>• A Climate Based Daylight Modelling (CBDM) must be carried out at the preliminary and developed design stages, in accordance with the daylight modelling requirements and guidelines set out in DQLS – Lighting.</li> <li>• The Useful Daylight Illuminance (UDI) target for learning spaces is 300lx to 2000lx for at least 60% of school hours, across at least 50% of the applicable floor area.</li> </ul>
<b>Non-Compliant Designs</b>	<ul style="list-style-type: none"> <li>• Where building geometry and site constraints make compliance with these daylighting requirements unpracticable, best endeavours should be used to provide good daylighting. The daylighting report should demonstrate that daylighting has been optimised and outline the constraints which justify non-compliance.</li> </ul>

## Electric Lighting Mandatory Requirements (New Build and Refurbishments)

- All luminaires must be 100% based on LED lamp technology.
- Given that many rooms in educational buildings are used for a variety of purposes, lighting arrangements must have local controls/switching, including dimmable lighting and task lighting.
- The minimum requirements for electric lighting in terms of standard maintained illuminances, uniformity ratio, limiting glare index, lamp appearance group, and lamp colour rendering group, are given in Table 4 in DQLS – Lighting.
- All new schools, significant refurbishments, and other facilities must have a security system as set out in Section 1.2.2 in DQLS – Lighting.
- Refer to DQLS – Lighting for expanded design guidance for specialist learning spaces, including both qualitative and quantitative guidance.

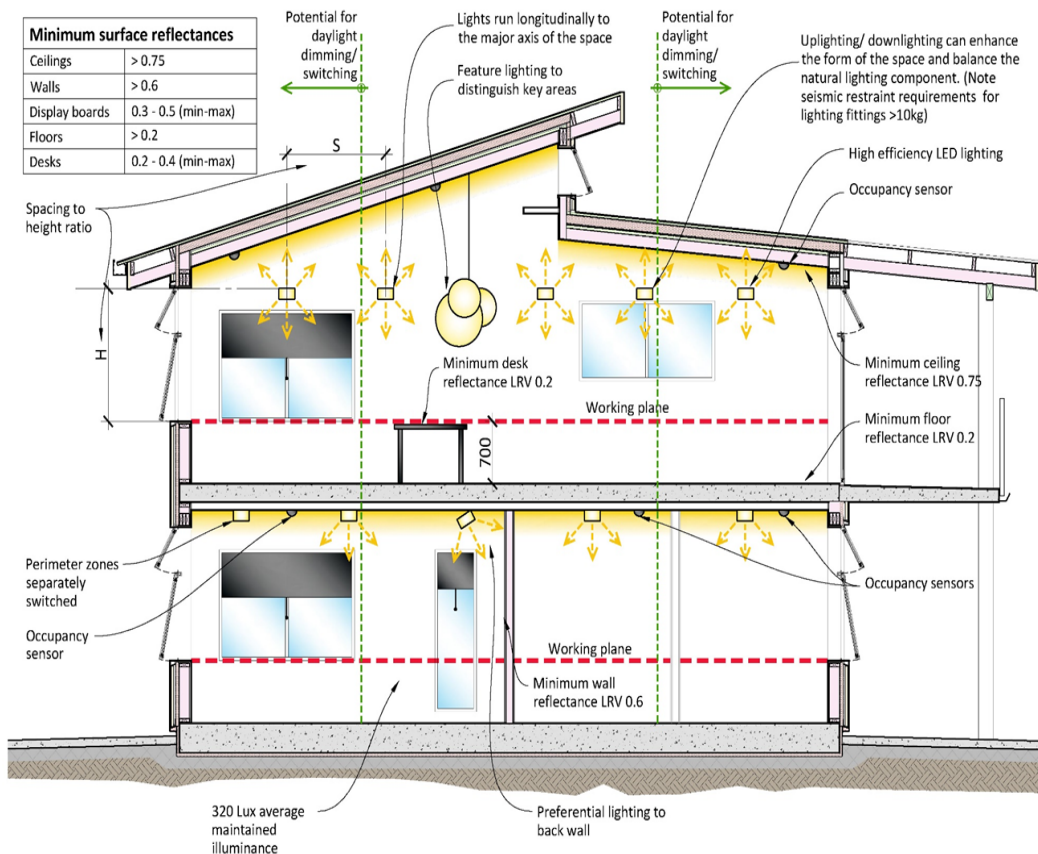


Figure 2: Summary of Electric Lighting Strategies

### Understanding Internal Environmental Quality

The requirements set out in the DQLS – Lighting are based on industry best practice, the latest research, feedback received from the Ministry’s design reviews and responses to a wide range of technical queries.

One of the key findings is the importance of having an integrated approach to building design, with an aim to optimise a building’s performance.

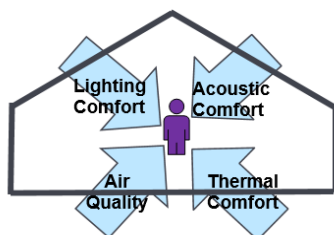


Figure 3: What is internal environment quality? Source: Bluysen, (2009)

The internal environmental factors in Figure 3 above must be addressed during the design phase so that comfort is achieved.

A holistic approach is essential, and no single internal environmental quality factor should be altered without assessing its effect on all the others, because they interact with one another.

### Refurbishment Recommendations

- In general terms, lighting strategies for upgrade projects are much the same as for new buildings because there is generally room for some improvement in lighting as part of any upgrade.
- If there are significant changes to layout, occupancy levels, activity types and/or there are significant problems with the existing lighting provisions, then the daylight and electric lighting requirements set out in Section 1 should be followed as far as is reasonably practicable.
- Walls, windows, floors, ceilings, roofs, doors and partitions all form part of the envelope of a space. Any change to these building elements should be investigated to determine its effect on the illumination (both daylighting and electric lighting) of the spaces.

This is a brief overview of the lighting requirements. The Ministry’s full requirements for lighting in schools is available on the Ministry’s website.

Other documents in the DQLS series that form part of the Ministry’s guidelines are: Acoustics and Indoor Air Quality and Thermal Comfort