

QODA

Building Bulletin 101: Ventilation of School Buildings

The current version of BB101 was published in 2006 to provide guidance for ventilation in schools. The aim is to ensure there is adequate fresh air in teaching spaces and a comfortable temperature in summer is maintained. This document is now regarded as outdated and minimum compliance with the standard is still likely to result in overheating. A new version of BB101 is currently under review by public consultation and proposes using the [TM52](#) method of assessing the risk of overheating. This technical summary provides an overview of the current guidelines, as well as the proposed new BB101 publication.

Assessing the Risk of Overheating in School Buildings

The current BB101 method uses fixed temperature thresholds to assess if overheating is likely to occur during summer months: the internal temperature should not exceed 32°C and the time above 28°C should be limited to less than 120 hours. These criteria pose problems with compliance:

- It is almost impossible to achieve compliance in a London-based naturally ventilated school as the external temperatures can exceed 32°C. Occupants are able to tolerate for short periods of high temperatures when it is also hot outside and therefore this criteria can inhibit compliance.
- Conversely, the time limit of less than 120 hours over 28°C is often seen as too lenient. If a space is always kept at 27°C it is deemed not be at risk of overheating under BB101 guidelines, although most people would agree that is too warm for a teaching environment all of the time, especially during periods of milder weather.

These criteria are now considered outdated as they do not provide any flexibility in terms of how people adapt to hotter weather. In the proposed new BB101 guidance document, the overheating assessment now follows the CIBSE TM52 “adaptive thermal comfort” approach which is based on research showing that people adapt to recent changes in external temperature. This means that throughout the year there is no single fixed temperature that most people feel comfortable at, for example 18°C feels warm in spring after a cold winter but feels mild after a prolonged warm period. See our guidance document on the CIBSE [TM52](#) methodology for more information.

Ventilation Provision in School Buildings

BB101 differs from CIBSE TM52 in how the standard addresses ventilation rates throughout the year, in addition to ensuring heat gains are sufficiently dissipated during summer months – it emphasises the need for good indoor environment quality (IEQ) all year. For example, windows open wide in summer could create a comfortable environment, but would be too cold and draughty in other seasons. If occupants close the windows to stop the draughts in winter they will not have any fresh air and the IEQ will suffer. The ventilation strategy must therefore be designed to cope with potential conflicts and BB101 provides guidance on how to achieve this.

In order to achieve good air quality all year round, both the current and proposed BB101 documents provide limits on the average and maximum carbon dioxide concentrations in classrooms. As a rule of thumb to achieve these target CO₂ concentrations, there should be a minimum ventilation rate of 4 l/s/p (litres per second per person) with the capability of achieving at least of 8 l/s/p at any time. This increased ventilation rate is known as purge ventilation and can be achieved with additional windows, louvres or stacks.

The new BB101 guidelines will also have a greater emphasis on how and where the fresh air is introduced into the room, and how it is controlled by the occupants. To avoid cold draughts around seated children it is recommended that fresh air is provided at high level so that it can mix with warmer room air. The position and mixing of incoming air can be overlooked during the design process in favour of just using modelling software to demonstrate the air rates are achieved and that the overheating criteria have been met.

For more details please contact a member of our team to arrange a lunchtime seminar which will provide a more in-depth appraisal of the new BB101 document and how it is likely to affect ventilation design within schools.
