

# Q & A

## Building Regulations Part O and Acoustics

ENGLAND ONLY



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### Why is The Building Regulations Part O significant with regards to acoustics?

Approved Document O (ADO) 'Overheating' England came into effect in June 2022 and sets requirements on limiting unwanted solar gains within residential properties.

The document lists four different methods for removing excess heat. Any method for controlling overheating must ensure the strategy is usable, including consideration of night-time noise in bedrooms. Other factors include pollution, security, protection from falling and protection from entrapment.

The intention of the acoustic requirement is to avoid residents having to choose between thermal comfort or adequate control of outdoor sound in bedrooms at night, which in turn affects sleep.

Acoustic assessments are required as part of compliance with Approved Document O to ensure that the strategy to remove excess heat for all new-build residential accommodation is useable for the site-specific environmental conditions. This must be known first, as restricted or closed windows has a direct influence on the overheating strategy.

It is, therefore, essential to engage the services of an acoustic consultant at an early stage of the development to understand the implications of satisfying the noise aspects of ADO.



### What are the requirements from an acoustics perspective?

The key acoustical requirement is to enable sufficient removal of excess heat in bedrooms at night using a method that does not cause excessive indoor sound levels. In setting standards, the government has decided to adopt the following criteria:

- **40 dB LA<sub>eq,8hour</sub>, which is a time averaged measurement over the full 8 hour night-time period between 23:00 and 07:00.**
- **A short duration maximum level of 55 dB LA<sub>max,f</sub> no more than ten times per night.**

These criteria are 10 decibels higher than standards widely used as representative of good conditions in bedrooms at night. The chosen standards therefore contain some relaxation, possibly in recognition of the (theoretically) shorter period over the year in which overheating control is needed.

The easiest and most obvious method for removing excess heat from a bedroom is to open windows, but in locations where external sound may be an issue, residents may prefer to close windows to control sound levels. ADO seeks ensure that the strategy to remove excess heat for residential accommodation in a development takes account of this.

Requirement 'OI' of ADO gives two methods for demonstrating compliance, being a simplified method and a dynamic thermal modelling method, both of which are design stage studies done and submitted with the Building Regulations application and are described below.

## The Simplified Method

ADO describes a simplified method for defining an overheating strategy, which is reliant on an open window to remove excess heat. If when opening a window to remove excess heat night-time bedroom sound levels are in excess of thresholds defined in ADO, an alternative method to remove excess heat must be adopted.

Given that the site environmental conditions dictate whether or not an open window can be used as part of the overheating strategy, it is therefore important to accurately quantify the noise environment by either measurement or prediction.

ADO categorises a building's overheating risk dependent on its location. The majority of the country is rated as being of 'Moderate Risk,' with some urban and suburban parts of London being categorised 'High Risk.'

The risk category defines the maximum glazed areas permitted in new developments, which also depends on whether the development incorporates cross ventilation and the direction that the main glazed façade faces.

For compliance with the simplified method, the open area required from windows must be at least 4% of the floor area of the room in moderate risk locations, and at least 13% of the floor area in high-risk locations.

This requirement on window open area has enabled the definition of an upper limit for external noise below which the simplified method can be used, detailed in the Association of Noise Consultants Guide to Demonstrating Compliance with the Noise Requirements of Approved Document O:

### Outdoor Sound Limits for Simplified Method Compliance

Parameter	High Risk Location	Moderate Risk Location
<b>L<sub>Aeq,8hr</sub>, averaged over 8 hours (between 11pm and 7am)</b>	44 dB	49 dB
<b>L<sub>AFmax</sub>, more than 10 times a night (between 11pm and 7am)</b>	59 dB	64 dB

Note: Several assumptions have been used to determine the outside-to-inside level difference. These are: 2.4m bedroom height, 0.5s bedroom RT, simple hole in the facade of area sufficient to provide the required equivalent area, no sound transmission other than via the opening. Calculation according to Equation G.1 of BS 8233:2014 [Ref. 7].

Acoustic survey work can be undertaken at a proposed development to quantify whether compliance with the acoustic requirements of ADO can be achieved using the simplified method.

## The Dynamic Thermal Modelling Method

Where the simplified method can't be used, or the developer chooses to adopt an alternative more flexible route, then dynamic thermal modelling is required.

The thermal modeller will predict overheating risk using CIBSE's TM59 methodology; ADO dictates some further requirements for use in the dynamic thermal modelling.

The modelling provides the flexibility to consider the specific design of a scheme proposed and can account for external shading devices, shading provided by existing built form, low g-value glazing or mechanical systems. It can also take account of the airflow provided by noise mitigating devices such as acoustic louvres and is the only option to demonstrating compliance in areas of poor air quality or where noise is an issue.

When undertaking dynamic thermal modelling on a building for compliance with ADO, it is essential that the construction manager, acoustic consultant and dynamic thermal modeller work together to understand any constraints to opening a bedroom window such that it is accurately defined in the modelling.

Acoustic consultants should show the level of sound insulation that is required for bedroom windows around the building and between the acoustic consultant and the thermal modeller, this sound insulation value must inform the degree to which a window can be opened. The level of sound insulation provided via a window varies depending on a number of factors, including the size of the window and the opening style (top hung, side hung, etc). Many of these factors also affect the air flow performance of the window opening.

It is worth noting that without accurate consideration of acoustics in the modelling, consultants are likely to assume a window is open to its full reach (650mm between inside face of the external wall and the handle, as prescribed in ADO). Where multiple bedroom windowpanes are open to this extent, the internal standards in ADO could be exceeded on sites with far lower noise levels than prescribed as thresholds for the Simplified Method.



## ? Who/what do they apply to?

The acoustic requirements of Approved Document O apply to noise within bedrooms of new residential buildings at night. While it is possible to use any habitable room for sleeping, the scope of ADO is confined to rooms specifically designated as bedrooms. All new residential buildings are covered by the guidance, including dwelling-houses, flats, student accommodation and care homes.

ADO does not apply to residential uses formed by material change of use.

The requirements apply to external noise sources such as road rail or air traffic, commercial and industrial sound, also sound from entertainment premises. It is generally accepted that natural sound sources such as wind and rain, naturally flowing water and birdsong all fall outside the scope of ADO.

## ? What measures can be taken to meet the new regulations?

A sensible initial step for any ADO overheating strategy is to understand the noise constraints to opening a window on a site. If outdoor sound levels are low enough, then open windows can be used as the dominant method for removal of excess heat from an acoustics perspective. It may be that restricted window openings are required to satisfy the noise thresholds in ADO and this then informs what amount of air flow (equivalent area or effective area) can be adopted within the dynamic thermal modelling.

This is best defined by the acoustic consultant providing a plan showing the outside to inside level difference required by bedroom windows. Where these requirements exceed 18-20dB, an open window is unlikely to be an option at night, and mechanical systems are likely to be needed.

ADO does not require the acoustic consultant to submit a report to Building Control. However, it does require the designer of the overheating strategy to submit evidence of the strategy and the designer must answer the question of whether there are any noise constraints on the site.

**(Note – ‘the designer’ is a term used in ADO and is the thermal modeller. They work for the developer, or person responsible for Building Regulations submission)**

This forms part of the submission to Building Control by the members of the design or construction team responsible for demonstrating Building Regulations compliance. Therefore, a technical report may be requested by Building Control to evidence any noise constraints on the site and clients should provide designers with sufficient information from an acoustic consultant for the designers to answer the question on noise constraints.

ANC members can provide assistance from the initial stages of planning to provide information to the design team on the likely implications of compliance with ADO, through to assisting the client with evidencing any noise constraints when submitting their Building Regulations application.



## Do I only have to consider noise when a Local Planning Authority considered external noise to be an issue?

Paragraph 3.2 of ADO states:

*3.2 In locations where external noise may be an issue (for example, where the Local Planning Authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).*

The example of when noise should be considered (where the Local Planning Authority considered external noise to be an issue...) is useful but does not define all the situations in which it is necessary to consider noise to comply with the standards in ADO. Many residential development sites that do not have planning conditions for noise would fail to comply with the noise standards in ADO. A professional consultant experienced in the assessment of noise and façade design should be engaged to determine whether or not the indoor noise thresholds in ADO would be exceeded by the intended overheating strategy.

The assessment of noise in relation to this regulation is therefore not limited only to sites where the Local Planning Authority consider noise to be an issue.



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