

The Future Buildings Standard

2021 Consultation on changes to Part L (conservation of fuel and power) and Part F (ventilation) of the Building Regulations for non-domestic buildings and dwellings, and overheating in new residential buildings

Response from the Institute of Acoustics

Introduction

The Institute of Acoustics (IOA) is the professional body for those working in the field of acoustics and noise management. Our members include consultants, academics and regulators. Our activities include working for the building industry, developers and local authorities in all matters associated with sound and noise management in the built and natural environment.

The IOA recognises the importance of this consultation in connection not only with the effective management of noise, but also the integration of that management with other aspects of the built environment. The Government's noise policy recognises that the management of noise cannot be treated in isolation and these proposals seek to embrace the inevitable interaction of noise, ventilation and overheating.

Given the importance, the IOA held three on-line workshops in March 2021 to enable its members to discuss the issues raised in the proposals and to contribute to the formulation of the Institute's response. A total of just under 100 IOA members attended the workshops and offered their views.

This response has been compiled by members of the Institute, setting out a consensus of those views and which has been endorsed by its Governing body.

With regard to overheating, mention is made in this response to the joint Association of Noise Consultants (ANC) and Institute of Acoustics: Acoustics, Ventilation and Overheating Residential Design Guide (AVOG) published in January 2020. It was prepared by members of both organisations and involved several years' work. The development of this guide included extensive consultation amongst the profession and describes a process which enables the issue of acoustics and noise management, ventilation and overheating to be addressed in a holistic and coherent manner.

The document can be found here – <https://www.ioa.org.uk/publications/acoustics-ventilation-and-overheating-residential-design-guide>.

Background

As indicated above, the IOA welcomes the opportunity to comment on the proposed changes to Part F (ventilation) and Part L (conservation of fuel and power) of the Building Regulations and relishes the creation of a guidance document on the control of overheating.

The IOA response focuses on each of these documents individually and provides responses to the consultation questions posed, as well as additional commentary on the documents.

As can be seen the IOA is very experienced in addressing these issues and would be happy to liaise with officials in order to assist in developing these proposals and in particular those associated with overheating over the coming months.

Approved Document F (ADF) – Ventilation – Volume 1

Upon review of the proposed ADF – Volume 1, the IOA appreciates the fact that the majority of the comments submitted as part of the IOA's 2019 consultation response were taken on board, namely the reintroduction of guideline noise levels from continuous mechanical ventilation systems and the need to control structure-borne noise from such systems.

Whilst there is always a risk of structure-borne noise from ventilation systems and the proposed ADF acknowledges the need for resilient fixings to help mitigate this, consideration should also be given to vibration transfer from such systems.

One of the comments that has not been addressed, however, relates to the need to consider the suitability of external noise levels to allow the opening of windows for purge ventilation. As purge ventilation is required in situations where increased air flow rates are needed for short periods of time, such as to rapidly dilute pollutants and / or water vapour, there is no policy requirement to include specific mitigation given that occupants would experience any increased levels of noise for only short periods.

Approved Document F (ADF) – Ventilation – Volume 2

Consultation Question 63): Do you agree with the proposed guidance for reducing noise nuisance for ventilation systems in non-domestic buildings?

a) Yes

b) No

IOA's response: a) Yes – please see further information below.

Further information

In principle, the consulted IOA members agree with the proposed guidance for controlling noise from ventilation systems in non-domestic buildings. However, care must be taken when referring to noise *nuisance* from ventilation systems, which has a set legal meaning. A more appropriate term would be to control noise *disturbance* from ventilation systems.

In addition to the above, consideration could be given to the mention of industry reference documents for non-domestic buildings, such as BS 8233:2014, BS 6472-1:2008, Building Bulletin 93, British Council for Offices and CIBSE Guide A, to point readers in the right direction to find relevant information on airborne and structure-borne noise for various building types.

Reference should also be made to the comments on vibration and purge ventilation given above for ADF – Volume 1.

Approved Document L (ADL) – Conservation of fuel & power

No noise-related consultation questions were provided on Approved Document L. While no specific reference is made to noise within the document, it does include guidance on a number of items that can impact on the acoustic performance of a development, namely the provision of insulation to improve thermal performance, and the use of heat pumps.

Reference to Approved Document E (ADE) – Resistance to the passage of sound

The addition of references to ADE where elements, such as insulation, are installed to improve the thermal performance of a building is welcome and will draw designers' attention to the implications of such elements on the sound insulation performance of walls and floors.

Heat pumps

One of the elements of the proposed Future Buildings Standard is the expectation that all homes would have a heat pump. Whilst the advantages of heat pumps in terms of reducing carbon emissions and other pollutants are clear, what does not appear to have been considered is the potential noise impact from these devices.

Any mechanical system that includes a fan (and compressor) has the potential to generate noise. As these pumps are attached to the exterior of a dwelling, the noise from them has the potential to impact on those living nearby.

Currently, such pumps can be installed using permitted development rights. At the time this legislation was implemented, the potential noise impact issue was recognised. Consequently, the requirements of the Microgeneration Certification Scheme (MCS) have to be followed by the installer in order to manage the potential noise impact from these devices.

If the Future Buildings Standard is to include heat pumps, it is essential that managing the noise from these units is included as an intrinsic part of this process in order to mitigate and minimise the potential adverse effects. Consideration should also be given to the fact that there is little evidence available on the potential impacts arising either from the intermittent nature of the source and/or changes in noise level/character throughout the lifetime of the unit due to poor installation and/or maintenance.

As a minimum, the IOA believes that reference should be made to:

- The permitted development requirement for air source heat pumps to not exceed 42 dB $L_{Aeq,5min}$ at 1 metre from a window or door opening of a habitable room in the façade of a neighbouring residential property (ignoring the effect of that façade);
- The assessment methodology set out in Microgeneration Installation Standard MCS 020 *Planning Standards for Permitted Development Installations of Wind Turbines and Air Source Heat Pumps on Domestic Premises*.

Reference could also be made to the assessment guidance set out in BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*.

Approved Document [X] (AD[X]) – Overheating

Consultation Question 81): How should the Government address the overheating risk?

- a) Through a new requirement in the Building Regulations and an Approved Document, as proposed in this consultation**
- b) Through Parts L and F of the Building Regulations**
- c) Through government guidance**
- d) I have an alternative approach**
- e) It isn't an issue that needs addressing**

IOA's response: d) I have an alternative approach. Whilst the IOA recognises there is merit in creating a new requirement in the Building Regulations to address the risk of overheating, there are concerns about relying entirely on the Building Regulations to address this issue, and the fact that this must also still be addressed at planning stage. Please see further information below.

Further information

The creation of this new draft Approved Document is an acknowledgement by Government that controlling and reducing the occurrence of high indoor temperatures is a key factor in protecting the health and welfare of the occupants of a building. It is a most welcome, ambitious and proactive task which has been enthusiastically received by the acoustic industry.

As noted above, the profession, through the work of the ANC and IOA has developed its own guide on this issue. However, that guide is designed to be used at the planning stage of a development.

The majority of members consulted as part of the IOA response have noted that the risk of overheating could indeed be addressed through a new requirement in the Building Regulations and an Approved Document. There was some uncertainty, though regarding whether the specific details and the potential flexibility of this requirement with regard to noise management would need further consideration.

Nevertheless, if the control of noise during overheating conditions were to become a Building Regulations requirement, local planning authorities (LPAs) would need to bring their policies in line with the new requirement. This would provide additional leverage to LPAs to impose the control of overheating in new residential developments and would likely improve consistency on the minimum standards across new dwellings.

Having said that, there was a strong view that the management of overheating control should feature early on during the planning stage of a building. This is because key design decisions that affect overheating, such as building location, its orientation and massing, are made very early during the process. Consequently, the ANC/IOA guide was designed to be used during the early planning stage. Furthermore, addressing these issues at an early stage would align with the considerations for good acoustic design, required by Government policy, and set out in ProPG: Planning and Noise, which was jointly authored by the IOA, the ANC and the Chartered Institute of Environmental Health (CIEH), and is referenced in the online Planning Practice Guidance. To further support the consideration of overheating at the planning stage, it may be worth considering including a reference to the AVOG within the Planning Practice Guidance – Noise webpage.

In addition, a potential drawback of implementing this new requirement in Building Regulations is that Building Control Officers may not be particularly well-equipped to deal with assessments of noise during overheating conditions due to the complexity of the issue. Consideration could, however, be given to the creation of an “accredited assessor” type scheme similar to the one currently in place for ADE and pre-completion sound insulation testing. This would allow Building Control Officers to defer to an expert when considering the impact of environmental noise on occupants when mitigating overheating. The IOA would be delighted to work with other industry bodies, such as the ANC, to develop a scheme to provide minimum competence standards, technical support and audit of people or companies undertaking this work.

In summary, the IOA can see merit in addressing the risk of overheating through a new Approved Document, provided that the following is considered:

- The noise levels given in Section 3 of the draft AD[X] are amended to reflect the guidance in the ANC/IOA AVOG;
- Flexibility is built into the requirements to ensure that undue constraints are not placed on the construction of new dwellings;
- Consideration is given to the creation of an accredited assessor scheme, similar to that in place to demonstrate compliance with the requirements of ADE, to allow Building Control officers to defer to an expert on noise and overheating matters; and
- The management of noise, ventilation and overheating still has a firm place at the planning stage making use of documents such as the ANC/IOA AVOG and the IOA/ANC/CIEH ProPG to avoid key decisions at the planning stage compromising the ability to achieve the optimum outcome.

Consultation Question 85): Do you agree with the simplified method as a means of compliance with the proposed new requirement to reduce overheating risk?

a) Yes

b) No, the method should be more sophisticated

c) No, the method is too easy to pass

d) No, for another reason

IOA’s response: b) No, the method should be more sophisticated – please see further information below.

Further information

Whilst the IOA agrees that a simplified method should be available to demonstrate compliance with the new requirement to reduce overheating, the proposed approach currently seems to be too simplistic. More importantly, the simplified method should not be more lenient than detailed methods.

IOA members also noted that the simplified method should allow for innovative design approaches to reduce the risk of overheating.

Consultation Question 94): Do you agree with limiting noise in new residential buildings when the overheating strategy is in use, and the proposed guidance in Section 3 of the draft Overheating Approved Document?

- a) Yes
- b) Yes, but with amendments to the guidance
- c) No, I do not agree with limiting noise when the overheating strategy is in use

IOA's response: b) Yes, but with amendments to the guidance – please see further information below.

Further information – approach

Paragraphs 3.1 to 3.4 of the draft AD[X] set out the proposed approach so that the overheating control strategy is usable with regard to noise. These paragraphs set noise limits in bedrooms at night (23:00 – 07:00) that should not normally be exceeded when the overheating control strategy is in use for both openings on the façade and when mechanical systems are used. They also provide guidance on the evidence required to satisfy these requirements.

Care needs to be taken when prescribing limits in this context. The Government's overall noise management policy has moved away from setting fixed limits and whilst there is merit in having target values to achieve, they should not be regarded as fixed thresholds. This view aligns with the Government's planning policy on noise management.

The presence of a section on noise in relation to overheating in the draft document is welcome, but the IOA is strongly of the view that the values used should reflect those contained in the ANC/IOA AVOG.

Some IOA members also suggested that for sites exposed to low levels of noise, a simplified approach to the full AVOG assessment methodology could potentially be used. The IOA would be happy to help develop a simplified method as well as providing support in the further development of the new Approved Document.

Further information – internal noise levels

The proposed document states the following with regard to internal noise levels.

“3.1. When the removing excess heat part of the overheating strategy is in use, noise levels in bedrooms should be kept to a minimum during the sleeping hours of 23.00 – 07.00. Noise within bedrooms should not normally exceed the following limits.

- a. *When openings are used*
 - i. *40 dB $L_{Aeq,T}$, averaged over 8 hours.*
 - ii. *55 dB L_{AFmax} , maximum no more than 10 times a night.*
- b. *When a mechanical system is used*
 - i. *30 dB $L_{Aeq,T}$, averaged over 8 hours.”*

The noise levels given when openings are used to control overheating are towards the upper end of those set out in Table 3-3 of the AVOG, though they do not necessarily match. As indicated above, during the IOA consultation, the majority of our members felt that as a minimum the numbers included in AD[X] should be in line with the recently published AVOG.

It was also acknowledged that there is a lack of evidence on the extent to which building occupants are willing to accept higher internal noise levels for lower indoor temperatures, and that further research on this topic is required.

The consultation with IOA members also included discussions on whether these noise levels should be strict limits (see above) or whether a more qualitative approach would be suitable, such as using a scale of compliance. For example, when establishing suitable relaxed internal noise levels, consideration could be given to their duration, how frequently they occur, the degree of occupant control and magnitude of the noise levels associated with the overheating condition. Alternative approaches such as the use of soundscapes instead of fixed noise limits were also tabled.

Guidance on suitable internal noise levels when a mechanical system is used to control overheating is also provided in the AVOG. A summary of the guidance is provided in Table 1 below for ease of reference. It can be seen that the base noise level in bedrooms is in line with that proposed as part of the new AD[X]. However, the AVOG and the consulted IOA members acknowledge that a relaxation of internal noise levels may still allow the impact on users to be appropriately managed, while avoiding overly stringent acoustic mitigation measures to mechanical systems.

Table 1 Desirable noise levels from mechanical systems in dwellings to control overheating

Possible system / design solution	Desirable upper internal ambient noise levels from mechanical services, L_{Aeq} (dB) ¹		
	Bedrooms	Living rooms	Bathrooms / WCs / kitchens
Ventilative cooling (increased air flow)	30	35	-
Comfort cooling (fan coil units, etc.)			

¹ Section 1.10.10 of CIBSE Guide A 2015 states that “Higher or lower values may be appropriate based on economics, space use, user needs etc.”. It goes on to state that a range of +/- 5 dB may be acceptable depending on the particular situation.

Higher noise levels are likely to be acceptable in some operating scenarios, where rapid changes to the cooling or ventilation rates quickly improve the thermal comfort of the occupant. Equally, lower noise levels may be appropriate for some types of residential development.

In addition to controlling noise levels in bedrooms during overheating conditions, the IOA believes that consideration should also be given to the management of internal noise levels in other habitable rooms in dwellings, such as living rooms, including during the daytime. With the recent trend towards flexible working, accelerated by the Covid-19 pandemic, it is anticipated that a large proportion of the population will be spending extended periods of time at home, and at a time of day when overheating is most likely to occur.

In summary, the AD[X] approach to control internal noise levels in dwellings when the overheating control strategy is in use should align with the guidance provided in the AVOG.

Under normal conditions (non-overheating), overall internal noise levels in dwellings should be designed in line with the guidance in documents such as BS 8233:2014 and ProPG.

Further information – demonstrating compliance

Paragraph 3.2 of the proposed AD[X] set out the various ways in which compliance with the proposed noise criteria can be demonstrated and the evidence required to do so. These include documentation demonstrating that the local planning authority did not consider external noise to be an issue at the site at the planning stage, internal noise measurements once the building is completed, or the modelling of the internal noise environmental. Paragraph 3.3 also comments on the appropriateness of sampling a number of dwellings where noise measurements are used upon completion of the building.

Whilst the options to demonstrate compliance are welcome and show the intention to provide flexibility to designers and contractors, IOA members believe that they require further development. For instance, additional guidance on a suitable assessment method and clearer sampling requirements, potentially in line with the sampling rate of ADE, would be useful.

As before, the IOA would be happy to help develop the means through which compliance can be demonstrated, as well as providing support in further developing the new Approved Document.

Consultation Question 101): How do you see this new Building Regulation interacting with policies in local plans?

If the need to control overheating is introduced as a statutory requirement of the Building Regulations, in theory there would be no need for this point to be covered in local plans as well. The Building Regulations would take precedence. However, as indicated above, even with this approach, the IOA believes that overheating considerations must also occur during the planning stage, so that the optimum outcome is achieved. In that case, local authorities would need to cover overheating and noise in their documents, and their policies would need to align with the new requirement.

Addressing noise levels in dwellings during overheating conditions through the Building Regulations would allow a more consistent approach throughout than if left to local authority policies. However, it must be remembered that as not every external situation is the same in every location, the individual solution would not be the same.

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