

## **AAAC Guideline for Gymnasium and Exercise Facility Assessment**

### **Explanatory Notes**

#### **1. Background**

AAAC member representatives began discussing the need for AAAC guidance on impact noise from gyms in early 2016. This was in the absence of an agreed position or standard assessment criteria. Some councils had also developed their own consent conditions regarding noise from such facilities, however without a framework for assessment and application these criteria proved difficult to apply consistently in practice.

It was identified that in addition to the overall target criteria the Guideline also needed to provide a standardised method to assess/test impacts/compliance (i.e. how many drops to test, how to average the results, how high to drop from, what weights to drop). As well as guidance on suitable locations for gyms in order of priority (ie: stand-alone building, industrial building, commercial building, retail building, mixed use).

#### **2. Basis for impulsive impact criteria:**

Following initial member feedback and discussions, a series of reviews were undertaken, including a questionnaire circulated to AAAC members in 2019. Although the guideline was ultimately prepared by a small sub-committee, the document was developed from input from a much larger number of members including 36 questionnaire responses representing more than 50% of our member firms. The responses to the questionnaire, experience of members, further discussion and member forum entries all contributed to the development of the Guideline.

Initially, criteria based around an  $L_{Amax}$  above background were explored. This was modified to restrict the  $L_{Amax}$  frequency of interest to 31-250Hz, as this is the region where the low frequency structure borne 'thump' from weight drops is transmitted through the building to receivers. Assessment across only this region makes measurement significantly easier, without excluding the noise of interest. It is somewhat similar to the approach in ISO 10140-3:2021 Annex A which looks at measuring the "impact sound insulation of a floor for heavy and soft impacts, such as from human footsteps (bare feet) or children jumping". This looks at  $L_{Fmax}$  levels in 63-500Hz octave bands.

The use of absolute level criteria, rather than criteria relative to background was ultimately adopted given:

- Background levels in apartments may be very low with windows closed, even in urban areas.
- Background levels in apartments cannot be determined prior to construction, or without gaining access from the residents to conduct measurements in the night.
- Background levels in the frequency range up to 250Hz, are often significantly lower than the broadband background noise level at the times of peak or greatest disturbance (night-time). Applying a background plus 5 dB criterion to these octave bands would generally be more onerous than the criteria recommended within the current gym guideline.

It is worth noting that the Guideline is intended to assist a consultant in assessing a site. Where the actual background ( $L_{A90}$ ) noise levels are so high that the  $L_{Amax(31-250Hz)}$  targets in the Guide are not appropriate the consultant can explain this and adopt a higher target.

In terms of the actual targets adopted, there was a review of member feedback, measurements from some members, as well as criteria including AS2107, the AAAC Start Rating Guideline and notably the ANC Gym Acoustic Guideline, which was still in draft at the time of publication of the Guideline.

Whilst the ANC Guideline was still in draft, it is one of the only directly comparable references. The ANC “starting point for the selection of suitable criteria” for impact noise was that activity not be greater than NR 15-20  $L_{max(5min)}$ . To compare this to the  $L_{Amax(31-250Hz)}$  criteria see below. The ‘thump’ from weight drops typically dominate one (or perhaps two) of the octave bands, so also included below are the equivalent  $L_{Amax(31-250Hz)}$  levels where only 1 or 2 octave bands in the NR curve are at their maximum level.

Calculation Scenario	$L_{Amax(31-250Hz)}$ for NR 15	$L_{Amax(31-250Hz)}$ for NR 20
All octave bands maximised	29	32
2 bands only maximised	21-28	26-31
1 band only maximised	18-27	23-30

Compared to the ANC guidance, for typical weight drop impacts, our  $L_{Amax(31-250Hz)}$  targets would fall around the middle of the NR15 range for Night, towards the upper end of the NR20 range for Evening and above both for Day.

Consideration was also given to WHO guidelines, however these did not have much relevance to low frequency structure-borne noise emission similar to that resulting from weight drops in the middle of the night.

The target levels could be difficult to measure during the daytime in some locations with high background noise levels, but are likely to be measurable at most sites during the early morning, evening or night-time periods. It does require the right equipment, software and analysis tools along with a degree of experience or expertise, and importantly will need post processing.

It is worth acknowledging that whilst the AAAC Guideline is not targeting inaudibility, it includes a very stringent set of targets. Some regulators may specify higher levels, that balance the need for ease of development and assessment of criteria, over very low acoustic intrusion, or disturbance, to residents. A consultant can use the document for guidance and put forward alternative criteria if they think it is appropriate. An analogy would be the AAAC Education guidelines that suggest very stringent targets for classrooms, compared to the NSW Government schools targets which specify say mechanical plant targets that are much higher, but allow them to provide air-conditioning to more schools than if they followed an ideal target. Another example would be the Guideline for Commercial Buildings (offices) that targets high levels of isolation to separate rooms, compared with many clients who will sacrifice some privacy / isolation in order to save money etc.

One thing that has been discussed is a future version may give a range of targets, where the current levels are the ‘gold standard’ but perhaps an acceptable ‘bronze’ level might be adopted at some sites. We reiterate that the guideline is provided for use when there is an absence of other suitable criteria, so if the Council (or other regulator) already has suitable criteria then that can be adopted.

### 3. Non-mandatory & not static

The AAAC guideline page states:

*"The Guidelines prepared by members of the Association of Australasian Acoustical Consultants (AAAC) are designed to assist proponents and operators, architects, planners, Local Government or regulatory authority officers and acoustical consultants to measure, predict and assess noise and vibration in a variety of settings. The objective of the Guidelines is to achieve consistent, accurate and fair assessments.*

*Member firms of the AAAC are encouraged to use the Guidelines where they are relevant. The Guidelines are advisory in nature and they are not statutory documents. The statutory requirements in each Australian State and Territory, or in New Zealand may vary. Care should be taken to adopt the local statutory requirements if they prevail over the Guidelines. In such cases, the procedures in some Guidelines may need to be modified to meet the specific local statutory requirements. If the statutory requirements are nonspecific or lacking detail, the Guidelines will assist in determining the appropriate assessment procedure."*

As indicated within the Guideline, the guideline is non-mandatory, not static and will be updated when appropriate to reflect experience gained through its use and application.

### 4. Further/Future work

As with all AAAC Guidelines, the document is open to review. One area of focus in the near term will be review of the now released final ANC Gym Acoustic Guidance (GAG) to see whether any additional information in this document is relevant and should be incorporated in the AAAC approach.

The AAAC welcomes comment and feedback from our members and others in relation to the use and application of the Guideline. This feedback will continue to be collated and will help to guide further amendments and versions of the Guideline.

A download link to the Guideline for Acoustics Assessment of Gymnasiums and Exercise Facilities can be found on the AAAC website [www.aaac.org.au](http://www.aaac.org.au)

**For more information and other published AAAC Guidelines, go to [www.aaac.org.au](http://www.aaac.org.au)**

To contact a AAAC member, select a region from the link below:

<https://aaac.org.au/member-firms>

Version	Date
1.0	July 2023
2.0	November 2023