

Association of Australasian Acoustical Consultants Guideline for Acoustic Assessment of Gymsnasiums and Exercise Facilities

Version 1.0



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1.0 INTRODUCTION

The number of gymsnasiums and exercise facilities has significantly increased over recent years, resulting in pressure to develop new facilities in a diverse range of urban settings.

Where a gymsnasium has potential to impact on residential or commercial receivers outside of the building that it is located within, most Australian and New Zealand jurisdictions have in place suitable noise criteria to assess such impacts. This Guideline does not seek to provide additional guidance in these circumstances and the facility can be assessed as any other commercial operation would be.

However, many such facilities are co-located within a building containing residential, or other sensitive receivers. In these instances, there is often a lack of clear criteria for assessing the potential noise and vibration impacts that may be transmitted within the building. Where this co-location of facilities occurs, this Guideline may be applied. Where there are a mix of receivers both within and outside the subject building, targets may be derived using both this Guideline and other local policy.

This Guideline has been prepared by members of the Association of Australasian Acoustical Consultants (AAAC) to assist proponents and operators, architects, planners, Local Government or regulatory authority officers, or acoustical consultants to assess the noise and vibration impact resulting from the use and operation of both existing and proposed gymsnasiums and exercise facilities consistently, accurately and fairly.

This Guideline is advisory in nature and is not a statutory document, but provides guidance in relation to the assessment and management of noise associated with exercise facilities including gymsnasiums. The AAAC recommends the use of this Guideline, to inform decision-making on the environmental regulation and management of noise and vibration from exercise facilities. It sets out noise mitigation and management measures which should be considered and a process for measuring and predicting noise levels and determining achievable noise limits for development consents.

It is noted that the criteria used in each Australian State and Territory, or in New Zealand may vary, and the procedures in this guideline may need to be modified to meet specific local requirements. However, the principles will remain the same. The recommendations in this Guideline are based on the common practice of AAAC members.

Additionally, some Local Governments (Councils) or other regulatory authorities may have their own specific requirements and policies, which should be relied on when carrying out an assessment. If the requirements are nonspecific or lacking detail, this Guideline will assist in determining the appropriate assessment procedure.

The scope of this Guideline does not cover noise amenity within the gymsnasium or exercise facility, as this is addressed in other Standards, such as AS2107.

This Guideline refers to the noise and vibration impact resulting from the use and operation of gymsnasiums and exercise facilities. It does not limit the number of patrons/members and staff at any one facility, however this may be limited by various planning controls, or the relevant regulatory or consent authority may have an upper limit that should be adhered to.

Note: For definition of terms, see the "Terminology" Tab on the AAAC web site or consult the services of an AAAC member.

1.1 Guideline Objectives

The use of various spaces for gymsnasiums and exercise facilities, which may be operated up to 24 hours each day, in close proximity to sensitive receivers, leads to potential noise and vibration impacts, which must be assessed.

The competing requirements of locating facilities in urban and residential neighbourhoods, providing a convenient location for exercise and the right of nearby neighbours to enjoy a reasonable acoustic environment are potentially at conflict and require a considered approach to planning and assessment for a gymsnasium or exercise facility.

The objectives of this Guideline are:

- To protect the reasonable acoustic amenity of nearby residential and other sensitive receivers;
- To provide guidance on appropriate considerations, along with noise objectives and criteria to ensure that a gymsnasium or exercise facility does not generate unacceptable noise or vibration emission to adversely impact on residential and other sensitive receivers within close proximity; and
- To provide guidance on appropriate noise control and management that can be incorporated into the operation of a gymsnasium or exercise facility.

A sensitive receiver may include any residential dwelling, commercial or other premises located within the same structure as a proposed gymsnasium or other exercise facility.

For a commercial or other premises, the activities carried out within that commercial or other premises and operating hours should be considered when determining the noise and vibration criteria.

Sensitive receivers may be located below, above or beside the gymsnasium or exercise facility, and may be directly adjacent, or separated by some space, and in some cases, may be separated by several floors.

There may also be further sensitive receivers located external to the subject building. It is important for the acoustic consultant to identify all sensitive receivers with potential to be impacted, and to assess noise and vibration emission to each.

The guidance within this document is based on the current experience and opinions of AAAC members. This Guideline will be reviewed periodically to reflect any changes of thought or expectations. Since the document may change, and given the complexity of the Guideline, it is recommended that the latest version of the document is obtained from www.aaac.org.au.

2.0 CONSIDERATIONS

2.1 Gymnasium and Exercise Facility Activities

A gymnasium (gym) or exercise facility is considered to be a building or space which is used to undertake exercise or fitness activities. Gyms and exercise facilities include a broad range of activities and exercise facilities, with activities undertaken including:

- Olympic lifting and heavy weights training
- Free weights, pin and plate loaded weights training
- Exercise classes
- Personal and functional training
- Cardio equipment and training
- Boxing exercise and training
- Dance studios, including ballet and barre
- Trampolining
- Climbing

Use of a home gym is excluded from this Guideline.

2.2 Gymnasium and Exercise Facility Site Selection

Proponents may seek to operate gyms and exercise facilities within many types of enclosed buildings or outdoor/open areas.

In relation to enclosed buildings, listed from most to least preferred from an acoustic perspective, these include:

- Stand-alone buildings (preferred)
- Industrial buildings
- Commercial buildings
- Retail buildings and shopping centres
- Mixed use and residential buildings

As gyms and exercise facilities have potential to result in adverse acoustic impacts at adjacent and nearby sensitive receivers, from an acoustic perspective, preferred enclosed building locations are:

- stand-alone buildings
- in buildings/tenancies on a slab poured at ground level (on ground), rather than a suspended slab in a multi-storey building

The type of treatment required for floor isolation can vary from rubber matting, to floating concrete floor on springs. This will generally be dependent upon the building structure, the activities undertaken, the type and sensitivity of receivers. Where substantial structural elements are required, such as floating concrete floors, the building structure may not enable such to be incorporated, hence this may influence site selection.

2.3 Acoustic Assessment Considerations

There are several factors to be considered, when assessing noise and vibration associated with the use and operation of a gym or exercise facility. The acoustic consultant should consider each factor relevant to the specific gym or exercise facility being assessed.

The use and operation of gyms and exercise facilities within multi-storey buildings can generate acoustic disturbances throughout various areas of a building when adequate acoustic treatment (mitigation and management) is not incorporated. Such acoustic disturbances are likely to fall within the following categories:

1. Vibration transmission – where vibration generated within the gym or exercise facility is transmitted through the building structure to another receiver property/occupancy;
2. Regenerated noise – where vibration from impacts is produced within the gym or exercise facility and transmitted through the building structure (structure-borne noise), then experienced as noise at or within an adjacent receiver property/occupancy; and
3. Airborne noise transmission – where noise produced within the gym or exercise facility is transmitted through the floor/ceiling or wall partitions into an adjacent receiver property/occupancy.

Acoustic disturbances associated with airborne noise transmission occur when the construction of partition wall and floor/ceiling construction systems are inadequate. Airborne sound transmission issues are unlikely to occur when the building has been appropriately designed and constructed to provide adequate acoustic privacy between occupancies, and airborne transmission issues are not specifically related to the type of flooring installed within gymnasiums or exercise facilities. However, it should be noted that any improvements to the flooring for the purpose of reducing impact noise are likely to correspond to an apparent improvement in airborne sound transmission performance, or a reduction in transmitted airborne sound.

The use of free weights and the dropping of heavy objects onto the floor of a gym or exercise facility are activities that frequently generate acoustic disturbance within the adjacent areas of a building, or more specifically, structure-borne (regenerated) noise and vibration transmission. Additionally, the use of weights machines, both pin and plate loaded, may produce similar disturbances, of a lesser magnitude.

In addition to the specific characteristics of the location, the type and proximity of the nearest sensitive receivers and the type of activities proposed to be undertaken, acoustic assessments need to consider the varying types of noise and vibration emission likely to be associated with the use and operation of the gym or exercise facility.

Although there may be others not listed here, for gyms and exercise facilities within enclosed buildings, noise and vibration emission sources which are the focus of this Guideline, include the following internal sources:

- Music and staff/instructors (amplified or PA)
- Patron/member and staff/instructors (voices)
- Weights (free, pin and plate loaded, Olympic lifting platforms)
- Cardio equipment
- Gym TRX (Total Resistance Exercise) frames
- Functional training (and associated free equipment) and exercise classes
- Boxing
- Ballet, barre, aerobics, dancing, martial arts and circuit training
- Trampolining and climbing

There may also be external noise sources, which would typically be covered by local regulations, and are not specifically covered by this Guideline. These include:

- Patron/member and staff arrival access and egress
- Motor vehicles, traffic and parking
- Mechanical plant and equipment

2.4 The Internal Acoustical Environment

The internal acoustic environment of the gym or exercise facility is also an important consideration for the experience of patrons/members and staff.

To provide the required acoustic environment, the following areas of potential acoustic impact would typically be considered in the design stage:

- external noise intrusion and mechanical services
- partition construction, sound insulation between spaces and sound flanking
- internal room acoustics of spaces
 - internal music and patron levels (acoustic comfort)
 - reverberation times and sound absorption
 - speech intelligibility
 - speech privacy
- vibration to internal areas of the gym and exercise facility

Such considerations are important for the effective operation of the gym or exercise facility. Although important, these considerations relating to the internal acoustic environment are not discussed further in this document, as this Guideline is principally intended to provide guidance on the assessment of noise and vibration impact at sensitive receivers, resulting from the use and operation of gyms and exercise facilities.

3.0 OBJECTIVES AND CRITERIA

While it would be desirable for all noise and vibration resulting from the operation of a gym or exercise facility to be both inaudible and imperceptible at all sensitive receiver locations, sometimes this is both impractical and unwarranted.

In an urban environment with competing uses in close proximity, and with different acoustic expectations, it is necessary to determine appropriate acoustic criteria that are fair, while still protecting the reasonable acoustic amenity of the sensitive receivers.

The use and sensitivity of short-term residential accommodation varies. The acoustician will need to assess the specific circumstance to determine whether a residential or non-residential criteria will be appropriate for such accommodation.

3.1 Establishing existing background noise levels

3.1.1 Background Noise Level - External

The background noise level should be measured using continuous noise logging for a period of at least seven (7) consecutive days. At least five (5) of those days must not be affected by adverse weather. Meteorological data may be measured on site or accessed from the nearest Bureau of Meteorology weather station.

Note: The determination of the background noise level is to be as outlined in the Regulation or Guideline for each State or Territory.

3.1.2 Logger Location - External

For the assessment of noise emission, the noise logger should be located to measure the background noise environment at a location most representative of the most affected sensitive receiver locations. If monitoring at this location is not possible, the acoustical consultant shall select another suitable and equivalent location to measure the background noise level. This measured representative noise environment should be used to establish relevant criteria for all sensitive receivers.

Additional noise logging may be necessary to assess the impact of noise intrusion into the gym or exercise facility. The acoustical consultant shall select a suitable location for such monitoring.

3.1.3 Instrumentation

The existing background noise level shall be measured using acoustical instrumentation which conforms to Australian Standard AS/NZS IEC 61672.1:2019 'Electroacoustics – Sound Level Meters – Specifications' as a class 1 or class 2. Acoustical instrumentation that conforms to AS 1259.2-1990 'Acoustics - Sound Level Meters – Integrating – Averaging', Type 1 or 2 may also be used.

3.2 Assessment Locations

Although not discussed further within this document, for the assessment of noise to receivers external to the building containing the subject gymnasium or exercise facility, if applicable, the assessment location is defined as the most affected point within any receiver property boundary. Examples of this location may be:

- 1.5 m above ground level;
- On a balcony at 1.5 m above floor level;
- Outside a window on the ground or higher floors.

For assessment of noise to internal receiver locations, the assessment location is defined as the most affected point within any receiver property. Examples of this location may be:

- 1.5 m above ground level;
- Within a habitable room or a workspace (ie. not a bathroom, toilet or laundry), near, but not at the centre of the room (to avoid any undue influence from standing waves).

For assessment of vibration to internal receivers the assessment location is defined as the most affected inhabited point within any receiver property. Examples of this location may be:

- On the floor of a habitable room or a workspace (ie. not a bathroom, toilet or laundry);
- Near the centre of the room or other most affected location within the room.

3.3 Residential Receiver Noise Criteria

3.3.1 General Noise Emission to Residential Receivers

The following criteria apply to noise emission from music, patrons and staff within the premises to residential receivers. Note should be made that "general noise" does not include the occasional impulsive noise from activities such as weight drops. Such noise sources are assessed under "Impulsive Noise":

- a) The $L_{A10(15min)}$ noise contribution from music, patrons and staff emitted from the gymnasium or exercise facility shall not exceed the background noise level in any octave band frequency (31.5 Hz to 8 kHz inclusive) by more than 5 dB at the boundary, or within at any affected residence between 7am* and 10pm (*8am on Sundays and public holidays).
- b) The $L_{A10(15min)}$ noise contribution from music, patrons and staff emitted from the gymnasium or exercise facility shall not exceed the background noise in any octave band centre frequency (31.5 Hz to 8 kHz inclusive) at the boundary, or within any affected residence between 10pm and 7am* (*8am on Sundays and public holidays).
- c) Notwithstanding compliance of the above, noise from music, patrons and staff at the gymnasium or exercise facility shall not be audible in any habitable room in any residential premises between the hours of 10pm and 7am* (*8am on Sundays and public holidays)."
- d) Where the $L_{A10(15min)}$ noise level is below the threshold of hearing, T_f at any Octave Band Centre Frequency as defined in Table 1 of International Standard ISO 226:2003 "Acoustics – Normal equal-loudness-level contours" then the value of T_f corresponding to that Octave Band Centre Frequency shall be used instead.

3.3.2 Impulsive Noise Emission to Residential Receivers

The following criteria applies to impulsive noise from weight-drops or other similar sources. Overall contributed L_{AFmax} within octave bands of interest (octave bands containing the impulse energy, generally 31.5 Hz to 250 Hz, as determined by the acoustic consultant) should not exceed the following levels:

$$L_{AFmax}(\Sigma Oct, 31.5-2500Hz) \leq 35 \text{ dB for daytime}^1$$

$$L_{AFmax}(\Sigma Oct, 31.5-250Hz) \leq 30 \text{ dB for evening}^2$$

$$L_{AFmax}(\Sigma Oct, 31.5-250Hz) \leq 25 \text{ dB for night-time}^3$$

Notes:

1. Daytime is 7am to 6pm
2. Evening is 6pm to 10pm
3. Night-time is 10pm to 7am* (*8am on Sundays and public holidays)
4. Justification would be required of the acoustician to vary any of the above

3.3.3 Sleep Disturbance to Residential Receivers

Sleep disturbance should be assessed in accordance with the requirements of the state, territory or country.

3.4 Non-Residential Receiver Noise Criteria

3.4.1 General Noise Emission to Non-Residential Receivers

The acceptable noise level in non-residential receivers will vary depending on the use of the space. For example a higher level of noise intrusion would be acceptable for an industrial receiver, compared to a school or office. Australian Standard *AS2107 Acoustics - Recommended design sound levels and reverberation times for building interiors* provides design sound level ranges for a variety of different areas of occupancy in buildings.

The AAAC recommends that the $L_{Aeq,15min}$ noise emission level resulting from the operation of the gymnasium or exercise facility should not exceed the lower extent of the design sound level range for the use given in Table 1 of AS2107, at the assessment location, as defined above, at all times. This includes both airborne and structure-borne noise from general noise sources such as music, patrons and staff associated with the operation.

Note should be made that "General Noise" does not include the occasional impulsive noise from activities such as weight drops. Such noise sources are assessed under "Impulsive Noise".

3.4.2 Impulsive Noise Emission to Non-Residential Receivers

The following criteria applies to impulsive noise from weight-drops or other similar sources. Overall contributed L_{AFmax} within octave bands of interest (octave bands containing the impulse energy, generally 31.5 Hz to 250 Hz, as determined by the acoustic consultant) should not exceed the following levels:

$$\begin{aligned}L_{AFmax}(\Sigma Oct, 31.5-250Hz) &\leq 40 \text{ dB for general uses}^1 \\L_{AFmax}(\Sigma Oct, 31.5-250Hz) &\leq 35 \text{ dB for sensitive uses}^2 \\L_{AFmax}(\Sigma Oct, 31.5-250Hz) &\leq 30 \text{ dB for critically sensitive uses}^3\end{aligned}$$

Notes:

1. General uses may include office spaces and general working areas
2. Sensitive uses may include private offices, classrooms, childcare and movie cinemas
3. Critically sensitive uses may include noise sensitive laboratories and board rooms
4. Justification would be required of the acoustician for the objective criteria adopted

3.5 Vibration Emission – General Operations

Perceived vibration resulting from the use and operation of gymnasiums and exercise facilities is generally not a significant issue at receiver locations. If structure-borne (regenerated) noise can be reduced to acceptable levels when designing mitigation, it is often the case that levels of vibration within receiver properties will be imperceptible. Accordingly, tactile vibration is usually a secondary concern after noise emission (airborne and structure-borne), when considering the effects of gymnasium and exercise facility activities on occupants of neighbouring receiver properties.

Although uncommon, it is possible that tactile vibration resulting from the use and operation of the gymnasium or exercise facility may be the main, or a significant issue in the assessment of some facilities. As such, this section provides some guidance for those rare occasions.

The acoustician should apply their knowledge and experience in assessing and providing advice, but should also consider the various standards and guidance available when assessing vibration associated with the use and operation of gymnasiums and exercise facilities.

Various Australian, New Zealand and International standards and guidance exist for the assessment of tactile vibration, however these are not specific to the assessment of gyms or exercise facilities.

The NSW EPA has conducted an extensive review of various vibration standards and provides good guidance, which can be used in other states, territories or in New Zealand, for the assessment of tactile vibration. The EPA document "*Assessing Vibration: a technical guideline*" presents preferred and maximum vibration values for use in assessing human responses to vibration and provides recommendations of the measurement and evaluation techniques. Note is made that the NSW EPA's Guideline provides non mandatory guidance.

Tables from the NSW EPA Guideline are provided below for reference, however the AAAC notes that the vibration resulting from the operation of gymnasiums and exercise facilities is likely to be neither continuous, nor impulsive, as per the EPA's Guideline definitions. As such, a typical objective for vibration emission from a gymnasium or exercise facility, is likely to fall within the ranges given by the NSW EPA Guideline for impulsive and continuous vibration.

For the provision of guidance, the AAAC considers that the "Continuous" levels may be used for guidance when assessing vibration from cardio areas, and repetitious or cyclical activities, given vibration resulting from such activities is typically continuous in nature, when in use.

The vibration events resulting from the dropping of weights may be classified as "occasional", typically with several occurrences per day, or per assessment period. Where the number of such events is only occasional the Preferred "Impulsive" levels may be used for guidance when assessing vibration from the weights areas. Where many weight dropping events are expected to occur during each period values below the "Impulsive" levels may be more appropriate. An acoustician should use their judgement for the assessment of specific uses and activities within the gymnasium or exercise facility.

The NSW EPA Guideline provides guidance on assessing intermittent vibration using vibration dose value (VDV). The AAAC does not consider the use of VDV to be appropriate for assessment of the effect of vibration resulting from the use and operation of gymnasiums and exercise facilities.

The acceptable weighted r.m.s. vibration acceleration values for impulsive vibration set out in Table 2.2 of the NSW EPA Guideline are presented within Table 1 below.

Table 1 – EPA Acceptable Impulsive Vibration Weighted r.m.s. Acceleration Values (mm/s²) (1-80Hz)

Location	Assessment period	Preferred value		Maximum value	
		z-axis	x- and y-axes	z-axis	x- and y-axes
Critical areas ¹	Daytime or Night-time	5	3.6	10	7.2
Residences	Daytime	300	210	600	420
	Night-time	100	71	200	140
Offices, school, educational institutions and places of worship	Daytime or Night-time	640	460	1280	92
Workshops	Daytime or Night-time	640	460	1280	92

Note: 1) Examples include hospital operating theatres and precision laboratories.

The acceptable weighted r.m.s. vibration acceleration values for continuous vibration set out in Table 2.2 of the NSW EPA Guideline are presented within Table 2 below.

Table 2 – EPA Acceptable Continuous Vibration Weighted r.m.s. Acceleration Values (mm/s²) (1-80Hz)

Location	Assessment period	Preferred value		Maximum value	
		z-axis	x- and y-axes	z-axis	x- and y-axes
Critical areas ¹	Daytime or Night-time	5	3.6	10	7.2
Residences	Daytime	10	7.1	20	14
	Night-time	7	5	14	10
Offices, school, educational institutions and places of worship	Daytime or Night-time	20	14	40	28
Workshops	Daytime or Night-time	40	29	80	58

Note: 1) Examples include hospital operating theatres and precision laboratories.

The vibration generated from the dropping of weights onto the gym floor typically induces maximum acceleration in the vertical axis. Accordingly, the "Preferred Value, z-axis" criteria in Table 1 and Table 2 above should be applied to the analysis and assessment.

The criteria for r.m.s. vibration velocity and peak velocity values for impulsive vibration set out in Table C1.1 of the NSW EPA Guideline are summarised within Table 3 below.

**Table 3 – EPA criteria for exposure to impulsive vibration
 Velocity Values (mm/s)**

Location	Assessment period	RMS velocity		Peak velocity	
		Preferred	Maximum	Preferred	Maximum
Critical working areas ¹	Daytime or Night-time	0.10	0.20	0.14	0.28
Residences	Daytime	6.00	12.00	8.60	17.00
	Night-time	2.00	4.00	2.80	5.60
Offices	Daytime or Night-time	13.00	26.00	18.00	36.00
Workshops	Daytime or Night-time	13.00	26.00	18.00	36.00

Note: 1) Examples include hospital operating theatres and precision laboratories.

The criteria for r.m.s. vibration velocity and peak velocity values for continuous vibration set out in Table C1.1 of the NSW EPA Guideline are summarised within Table 4 below.

**Table 4 – EPA criteria for exposure to continuous vibration
 Velocity Values (mm/s)**

Location	Assessment period	RMS velocity		Peak velocity	
		Preferred	Maximum	Preferred	Maximum
Critical working areas ¹	Daytime or Night-time	0.10	0.20	0.14	0.28
Residences	Daytime	0.20	0.40	0.28	0.56
	Night-time	0.14	0.28	0.20	0.40
Offices	Daytime or Night-time	0.40	0.80	0.56	1.10
Workshops	Daytime or Night-time	0.80	1.60	1.10	2.20

Note: 1) Examples include hospital operating theatres and precision laboratories.

4 TESTING AND VERIFICATION OF IMPACT NOISE

The impact noise generated and transmitted to receivers at a particular site will depend on a range of factors, including:

- The mass of weights being dropped
- The height from which weights are dropped
- The construction and structural resonances of the building
- The construction, including impact isolation, of the flooring to the weights area

It is important to carry out consistent measurements of impact noise in the subject building, both upon completion, and where possible, before finalisation of the impact isolation design.

A series of at least four (4) weight drops should be carried out for each location under test. The overall $L_{AFmax}(\Sigma_{Oct,31.5-250Hz})$ should be calculated / measured for each drop and the logarithmic average of all drops taken as the final level, for comparison with criteria.

The mass and height from which the weights are dropped must be recorded and be consistent with the proposed plan of management for the site. For some facilities that do not allow for high weight drops, a height of 200mm above the floor may be a worst-case representative of a patron gently placing the weight on the floor. For other facilities where weights are routinely dropped from a greater height (such as chest height) a representative height, such as 1500mm, may be appropriate.

It is important that the tested scenario(s) is representative of the proposed use of the facility, and reflected in the plan of management. The consultant should consider what management and monitoring procedures can be implemented to ensure that operation outside of the plan of management does not occur. For example, weight drops from greater heights or weight drops during times when weight drops are not allowed to occur. In such instances the patron/member responsible may need to be provided with warnings/cautions, or ultimately has their privileges revoked.

5 ACOUSTIC MITIGATION AND MANAGEMENT (INFORMATIVE)

This informative section provides suggestions on mitigation and management measures which may be incorporated into gymsnasiums and exercise facilities. Not all recommendations will be relevant or appropriate to all facilities but provide an overview of measures, which should be considered.

- 1) A management plan incorporating measures to protect the acoustic amenity of the surrounding area should be implemented by the proprietor. Such a management plan should outline policies and procedures to ensure noise emission from patrons/members are kept to a minimum
- 2) Ensuring the glass windows/doors are kept closed at all times (other than when patrons/members enter and exit the premises);
- 3) The erection of clear signage at all entries and exits advising patrons/members that they must not generate excessive noise when entering and leaving the premises;
- 4) Staff monitoring the behaviour of patrons/members within the subject premises and as they enter/exit to ensure noise emission of patrons/members is kept to a minimum;
- 5) Restricting the use of low frequency speakers (sub-woofers) and ensuring any full range speakers are isolated from building structure;
- 6) The use of free weights over 20kg are to be restricted to the free-weights area only. Free weights under 20kg are restricted to the free-weights area and functional training area;
- 7) Reduction of the internal maximum $L_{Aeq(15min)}$ noise level from music within various internal areas. Note is made that the maximum internal reverberant sound pressure level can be determined and set to ensure the adjacent receivers are not adversely affected by the operation, following the fit-out of the premises and the installation of the speaker system;
- 8) The noise level of background music should be kept to an appropriate level, to enable speech intelligibility, and to ensure patrons/members are not required to raise their voices;
- 9) Installation of impact sound absorbing flooring to reduce the regenerated noise and vibration in areas where high levels of impact are expected.
 - Free-weights areas;
 - Any area free-weights are used or stored;
 - Functional training areas; and
 - Pin- and plate-loaded machine areas.

The implementation of an appropriate management policy regarding the dropping of weights, including:

- Education and training of all gym staff, personal trainers and patrons/members, instructing how to place weights without dropping;
- Erection of clearly visible signage throughout the gym advising patrons/members that they must not drop weights or allow weights to drop on the floor, or use weights outside the designated weight areas; and
- Imposition of penalties (membership warnings, suspensions or lockout restrictions) on patrons/members identified dropping weights.

- 10) For pin & plate loaded weights equipment it is recommended to incorporate springs into equipment where feasible. Although unlikely to offer such treatments without prompting or specific request, most manufacturers/suppliers of pin and plate loaded weights equipment are now able to fit springs and/or soft rubber supports/mounts to the pin and plate loaded weights equipment they supply.
- 11) It is recommended that any free weights equipment is positioned as close as practical to the most rigid part of the subject tenancy. Such locations are likely to be next to load bearing walls or as close as practically possible to structural columns. Further, weights areas should be located away from residences located directly above, below or adjacent.
- 12) Where possible cardio equipment should also be placed as close as practical to the most rigid locations within the tenancy, however this is less critical than the location of the free weights and pin and plate loaded weights equipment.
- 13) The use of weights (dumbbells, barbell, kettlebells, plates and medicine balls) and pin/plate loaded machines is to be restricted to specific areas where appropriate impact isolating flooring has been installed;
- 14) Include a condition of membership that management may reprimand a patron/member by way of fine, suspension or expulsion if they are found to repeatedly drop weights in a way contrary to that allowable;
- 15) Any frames and equipment fasteners should be decoupled from the building structure via the use of a resilient pads or sleeves.;
- 16) Consideration should be given to the installation of a soft material such as carpet or thick fabric on to equipment surfaces where there is a potential for high impact (i.e. arms/hooks of barbell racks);
- 17) The Plan of Management for the facility should include a procedure to respond to any complaints. This should include recording and responding to all complaints. Discussions between the complainant and operator should be undertaken as quickly as possible, as cooperation can often resolve issues in a more timely manner. The records of complaints should include, as a minimum, the location of the complainant, the typical time of intrusion and nature of the complaint (noise/vibration/structure-borne/impulsive). The operator should investigate possible sources of complaint, for example by conducting representative testing and measurements. Additional noise mitigation and management measures may be required to reduce and manage the disturbance.

5.3 Conditions of Consent

Local Councils and consent authorities can ensure that the gymnasium or other exercise facility will provide a reasonable acoustic amenity for all sensitive receivers by including appropriate Conditions of Consent in the development approval. The following conditions are examples of conditions that could be included.

- **Prior to Issue of the Construction Certificate**

Prior to the issue of a construction certificate, the construction certificate drawings shall be reviewed by an acoustical consultant employed by a AAAC member firm company to ensure that the recommendations made in the [approved acoustic report] have been incorporated into the drawings. A design compliance report detailing the review shall be submitted to the PCA and/or Council.

- **Prior to Issue of the Occupation Certificate**

Prior to the issue of an occupation certificate, testing shall be carried out by an acoustical consultant employed by a AAAC member firm company to demonstrate that the activities proposed to be carried out within the premises satisfy the noise criteria presented in the [approved acoustic report]. A report detailing the results of the testing shall be submitted to the PCA and/or Council.

For more information and other published AAAC Guidelines, go to www.aaac.org.au

Member Firms:

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

<http://www.aaac.org.au/act>

<http://www.aaac.org.au/nsw>

<http://www.aaac.org.au/qld>

<http://www.aaac.org.au/sa>

<https://aaac.org.au/tas>

<http://www.aaac.org.au/vic>

<http://www.aaac.org.au/wa>

<http://www.aaac.org.nz>

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