

GYMNASIA and SPORTS HALLS

WHY DO WE NEED TO CONTROL NOISE IN GYMNASIA AND SPORTS HALLS?

Gymnasia and sports halls are high volume buildings with few contents and where the majority of the internal surfaces are reflective: plastic or wooden floors, concrete walls, glass.

Reverberation time which affects the clarity with which sound is heard will be high, as much as 5 seconds without acoustic control, and, due to the shouts and games of people using the facilities, decibel levels can be as much as 90 dB(A). This noise is disruptive and can have serious consequences as far as behaviour and safety are concerned.

During teaching sessions or sporting events, levels of noise increase with shouts and whistles. In such conditions it is difficult to hold a conversation and the ambient noise level will cause fatigue among the coaches and participants.

Acoustic control at the design stage of the building allows players to talk to each other and give each other Instructions. These messages can be correctly heard and supervision of proceedings is made easier.

INTERNAL CORRECTION

This concerns the internal comfort of the gymnasium or sports hall.

The Sports Council recommends a reverberation time range of 1.8 - 3 seconds (mid frequency values for an empty hall) depending on hall volume. Department for Education guidelines recommend a maximum generated noise level from activity within the building ($LA_{eq,8hr}$) of 85.

French codes of practice recommended maximum reverberation times in relation to hall volume:

Maximum Tr (average of 125 to 4000 Hz) = $0.14 \times (V)^{1/3}$
where V (in m^3) is the volume of the gymnasium.

However, because reverberation time is determined by the shape and , composition of the internal surfaces, it is recommended that an acoustic analysis is undertaken, using computer simulation techniques.

INSULATION WITH RESPECT TO THE EXTERNAL ENVIRONMENT

This concerns the transmission of noise from the inside to the outside of the building and vice versa. Department for Education guidelines recommend a maximum background noise level from adjacent areas, ventilation and traffic noise ($LA_{eq,8hr}$) of 50 and minimum insulation between similar rooms (D_w (dB)) of 33. Local planning requirements are likely to further limit the amount of sound escaping from the building in order to protect people living nearby.

Such characteristics depend upon the type of materials used in the building's construction and the distance from its neighbours.

The performance of a roof or wall is limited by weak points (doors, windows, ducts, chimneys, etc....) and therefore specifying even the highest quality cladding could prove to be a futile exercise. (A concrete wall one metre thick will be completely ineffective if the doors and windows are left open).

An acoustic analysis will identify the optimum achievable performance and the most suitable materials to be specified.

ESSENTIAL INFORMATION REQUIRED FOR AN ACOUSTIC ANALYSIS

Internal Correction

- plans and sections showing the internal layout of the premises
- type and composition of the internal surfaces - walls, floor and roof
- report on any existing acoustic control measures or previous acoustic studies
- type of treatment envisaged - wall, ceiling, partitioning...
- any specific aesthetic requirements

Insulation with respect to the exterior of the building

- plans and sections showing the external layout and its environment
- type and composition of all external surfaces - doors, windows , walls, ventilation units...
- report on any measures already undertaken or previous acoustic studies
- any specific aesthetic requirements

MATERIAL CHARACTERISTICS

The materials to be used in the construction must:

- be as absorbent as possible, especially at frequencies of 500 to 2000 Hz which is the level of children’s shouts
- be resistant to shock from balls and other degradation
- be non-combustible.
- be designed to eliminate the problems caused by condensation

Priority:

Because of its large surface area treatment of the roof or ceiling is vital. In addition treatment of the cladding near the roof junction and adjacent walls will also be required.

SOLUTIONS FROM AXTER

Internal correction

The following systems meet the conditions commonly required in gymnasias and sports halls:

Roof	ANTISON SUPER ALPHA AQUALPHA
Cladding:	ANTISON

For premises with high levels of humidity, AQUALPHA is the only possibility.

Internal correction + insulation

in most cases, the products mentioned above will suffice. In more severe cases, **THERMOSON A** roofing system and **THERMOSON A or B** cladding can be installed.

EXAMPLE

GYMNASIUM at GRAND MONTMARIN, VESOUL (Haute Saône)

Parties involved:

- Building Owner: Vesoul Council
- Architect: Philippe HOUOT, Architect at St Dié

Dimensions: 40 m x 25 m x 8 m high

Composition of internal surfaces:

- Ground: Plastic covering on concrete floor
- Walls: To a height of 3.4 m: timber cladding on masonry
From 3.4 m to 5.7 m: metal cladding, ANTISON
- Roof: Profiled metal roof, SUPER ALPHA type
- Opaque polycarbonate rooflight

History:

Recognising the importance of acoustic control in sports premises, the architect designed this new gymnasium to include internal surfaces which were sufficiently absorbent.

Results:

Once the building was completed control tests were carried out with the following result:

Average maximum recommended	Tr = 3.1 seconds
Average measured	Tr = 1.3 seconds

The result was a considerable improvement on the recommended figure and proved that combined acoustic treatment of the roof and the walls with an absorbent material results in a comfortable environment which more than meets the needs of the users.

Bibliography

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