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ROYSIA HOUSE,
JOHN STREET, ROYSTON

NOISE EXPOSURE ASSESSMENT

Report **13081-NEA-01**

Prepared on 18 December 2017

Issued For

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Institute of Acoustics sponsoring organisation
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Contents

1.0 INTRODUCTION 1
2.0 SITE DESCRIPTION 1
3.0 ENVIRONMENTAL NOISE SURVEY 2
3.1 Procedure 2
3.2 Equipment 3
4.0 CRITERIA 3
4.1 Internal Noise Criteria 3
5.0 RESULTS 4
5.1 Environmental Noise Survey 4
6.0 NOISE EXPOSURE ASSESSMENT 5
6.1 External Building Fabric - Non Glazed Elements 5
6.2 External Building Fabric - Specification of Glazed Units 5
7.0 CONCLUSION 7

List of Attachments

13081-SP1	Indicative Site Plan
13081-TH1-2	Environmental Noise Time Histories
Appendix A	Glossary of Acoustic Terminology

1.0 INTRODUCTION

Clement Acoustics has been commissioned by Suralex Estates Ltd to assess the suitability of the site at Roysia House, John Street, Royston, SG8 9JH for residential development in accordance with the National Planning Policy Framework published on 27 March 2012 (replacing Planning Policy Guidance 24).

Proposals are to redevelop existing commercial storeys at Roysia House to comprise residential apartments. A 1st floor night-club and upper storey offices will be converted, while a ground floor restaurant will be retained.

This report presents the results of environmental noise surveys undertaken in order to measure prevailing background levels and outlines any necessary mitigation measures.

2.0 SITE DESCRIPTION

The proposed storeys for development are currently used as a night-club and offices, with plans to comprise a number of residential units. The area is predominantly commercial in nature, located in the centre of Royston. Roysia House is bound by Jepps Lane to the north, John Street to the south, a parking area to the east and commercial buildings to the west.

At the time of the survey, the background noise climate was dominated by road traffic and pedestrian noise from John Street at the front of the site and by existing commercial plant unit noise at the rear of the site.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Procedure

A noise survey was undertaken at two positions on the proposed site as shown in Figure 13081-SP1. The locations were chosen based on accessibility and in order to obtain representative noise levels due to the main observed noise sources around the site.

The surroundings and position used for each monitoring location was as follows:

- Position 1: The microphone was mounted on a 2nd storey window at the front of the building. The microphone was positioned 1m in front of the window and as such the monitoring position is not considered free-field according to the guidance of BS8233:2014. Based on the presence of the reflective surface and the nature of surrounding noise sources, a correction for reflections of 2 dB has been applied, in line with the recommendations of the standard. Noise levels at Position 1 were dominated by road traffic and pedestrian noise during collection and installation of equipment.
- Position 2: The microphone was mounted on a 2nd storey window at the rear of the building. The microphone was positioned 1m in front of the window and as such the monitoring position is not considered free-field according to the guidance of BS8233:2014. Based on the presence of the reflective surface and the nature of surrounding noise sources, a correction for reflections of 2 dB has been applied, in line with the recommendations of the standard. Noise levels at Position 2 were dominated by plant noise due to installations servicing nearby commercial units during collection and installation of equipment.

Continuous automated monitoring was undertaken for the duration of the survey between 13:00 on 7 December 2017 and 15:00 on 11 December 2017.

Weather conditions were generally dry with light winds, therefore suitable for the measurement of environmental noise. There were some short periods of snowfall, although these are not expected to have adversely affected the survey.

The measurement procedure generally complied with BS 7445:1991: '*Description and measurement of environmental noise, Part 2- Acquisition of data pertinent to land use*'.

3.2 Equipment

The equipment calibration was verified before and after use and no abnormalities were observed.

The equipment used was as follows.

- 2 No. Svantek Type 977 Class 1 Sound Level Meter,
- Norsonic Type 1251 Class 1 Calibrator.

4.0 CRITERIA

4.1 Internal Noise Criteria

BS 8233:2014: '*Guidance on sound insulation and noise reduction for buildings*' describes recommended acceptable internal noise levels for residential spaces during daytime and night-time hours. These levels are shown in Table 4.1.

Activity	Location	Design range $L_{eq,T}$ dB	
		Daytime (07:00-23:00)	Night-time (23:00-07:00)
Resting	Living Room	35 dB(A)	-
Dining	Dining Room/Area	40 dB(A)	-
Sleeping	Bedroom	35 dB(A)	30 dB(A)

Table 4.1: BS8233 recommended internal background noise levels

The latest revision of the document does not include a recommended maximum internal noise level. However, in order to provide a suitably robust assessment, the guidance of the previous document (1999 revision) will be used, which is based on WHO recommendations.

BS 8233:1999 states that for reasonable standards in a bedroom at night, individual noise events should not normally exceed a maximum noise level L_{Amax} of 45 dB(A).

The external building fabric would need to be carefully designed to achieve these recommended internal levels.

5.0 RESULTS

5.1 Environmental Noise Survey

The $L_{Aeq:\ 5min}$, $L_{Amax:\ 5min}$, $L_{A10:\ 5min}$ and $L_{A90:\ 5min}$ acoustic parameters were measured throughout the duration of the survey.

Measured levels are shown as a time history in Figures 13081-TH1 and 13081-TH2.

	Ambient Noise Level $L_{eq,T}$	Typical Maximum Noise Level $L_{max,\ 5min}$
POSITION 1		
Daytime [07:00 - 23:00]	59 dB(A)	-
Night-time [23:00 - 07:00]	52 dB(A)	73 dB(A)
POSITION 2		
Daytime [07:00 - 23:00]	67 dB(A)	-
Night-time [23:00 - 07:00]	55 dB(A)	76 dB(A)

Table 5.1: Site average noise levels for daytime and night time

The levels presented in Table 5.1 are as expected considering the site location close to a town centre. Levels at the rear are noticeably louder during daytime hours due to the effects of existing plant installations. Provided adequate mitigation measures are put in place during the design and construction phase of the development, recommended internal noise levels can be achieved. Outline mitigation measures are described in Section 6 of this report.

Maximum noise levels shown in Table 5.1 are deemed to be 'not normally exceeded' as required for maximum internal noise level specification purposes.

6.0 NOISE EXPOSURE ASSESSMENT

6.1 External Building Fabric - Non Glazed Elements

It is currently assumed that the non-glazed external building fabric elements of the proposed development would be comprised of existing masonry. This would contribute towards a significant reduction of ambient noise levels in combination with a good quality window configuration, as shown in Section 6.2.

All non-glazed elements of the building facades have been assumed to provide a sound reduction performance of at least the figures shown in Table 6.1 when tested in accordance with BS EN ISO, 140-3:1995.

Element	Octave band centre frequency SRI, dB					
	125	250	500	1k	2k	4k
Non glazed element SRI	41	43	48	50	55	55

Table 6.1: Non-glazed elements assumed sound reduction performance

6.2 External Building Fabric - Specification of Glazed Units

Sound reduction performance calculations have been undertaken in order to specify the minimum performance required from glazed elements in order to achieve recommended internal noise levels shown in Table 4.1.

Calculations will be based on bedrooms, which have more onerous requirements particularly during night-time hours.

Calculations have been based on mostly bedrooms with relatively higher ratios of glazing to masonry, in order to present a more onerous assessment.

This specification therefore presents the most robust assessment, for BS 8233:2014 criteria for internal noise levels in a bedroom at all affected facades.

As a more robust assessment, L_{Amax} spectrum values of night-time peaks have also been considered and incorporated into the glazing calculation in order to cater for the interior limit of 45 dB L_{Amax} for individual events, as specified in BS 8233:1999 and WHO guidance.

The minimum sound reduction index (SRI) value required for all glazed elements to be installed is shown in Table 6.2. The performance is specified for the whole window unit, including the frame and other design features.

Glazing Type	Required Sound Insulation for Glazed Elements	Required Sound Insulation for Ventilation
Type A [*Front and Side Facades*]	Required Sound Reduction: R_w 31 dB Typical Glazing Configuration[1]: *4mm glass/12mm gap/4mm glass*	Required Sound Reduction: $D_{n,e,w}$ 30 dB Typical Ventilator[1]: *Acoustic Trickle Ventilator*
Type B [*Rear Facade*]	Required Sound Reduction: R_w 37 dB Typical Glazing Configuration[1]: *6mm glass/12mm gap/7mm glass*	Required Sound Reduction: $D_{n,e,w}$ 35 dB Typical Ventilator[1]: *Acoustic Trickle Ventilator*

Table 6.2: Required glazing performance

[1] *The typical configurations shown are for indicative purposes only. Certificated performances should be sought from the manufacturer(s)*

All major building elements should be tested in accordance with BS EN ISO 140-3:1995. Sole glass performance data would not necessarily demonstrate compliance with this specification.

No further mitigation measures would be required to achieve recommended internal noise levels.

7.0 CONCLUSION

An environmental noise survey has been undertaken at Roysia House, John Street, Royston, SG8 9JH in order to measure ambient noise levels in the area.

Measured noise levels have allowed an assessment of the level of exposure to noise of the proposed development site to be made.

Outline mitigation measures, including a glazing specification and the use of appropriate ventilation have been recommended and should be sufficient to achieve recommended internal noise levels for the proposed development according to BS 8233:2014.

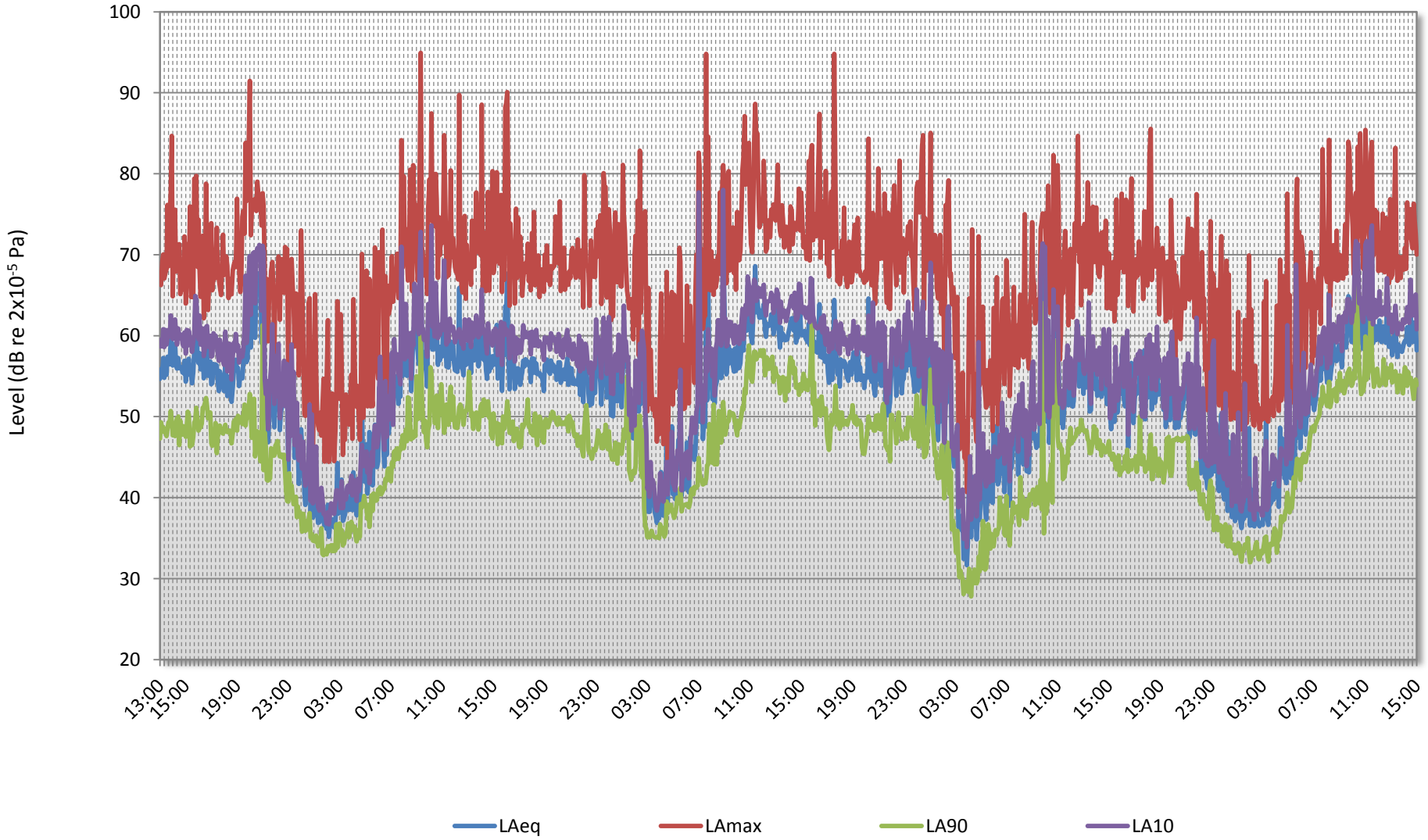
Report by	Checked by
Duncan Martin MIOA	**Florian Clement MIOA**



13081-SP1 Indicative site plan indicating noise monitoring position and site surroundings **Date:** 18 December 2017

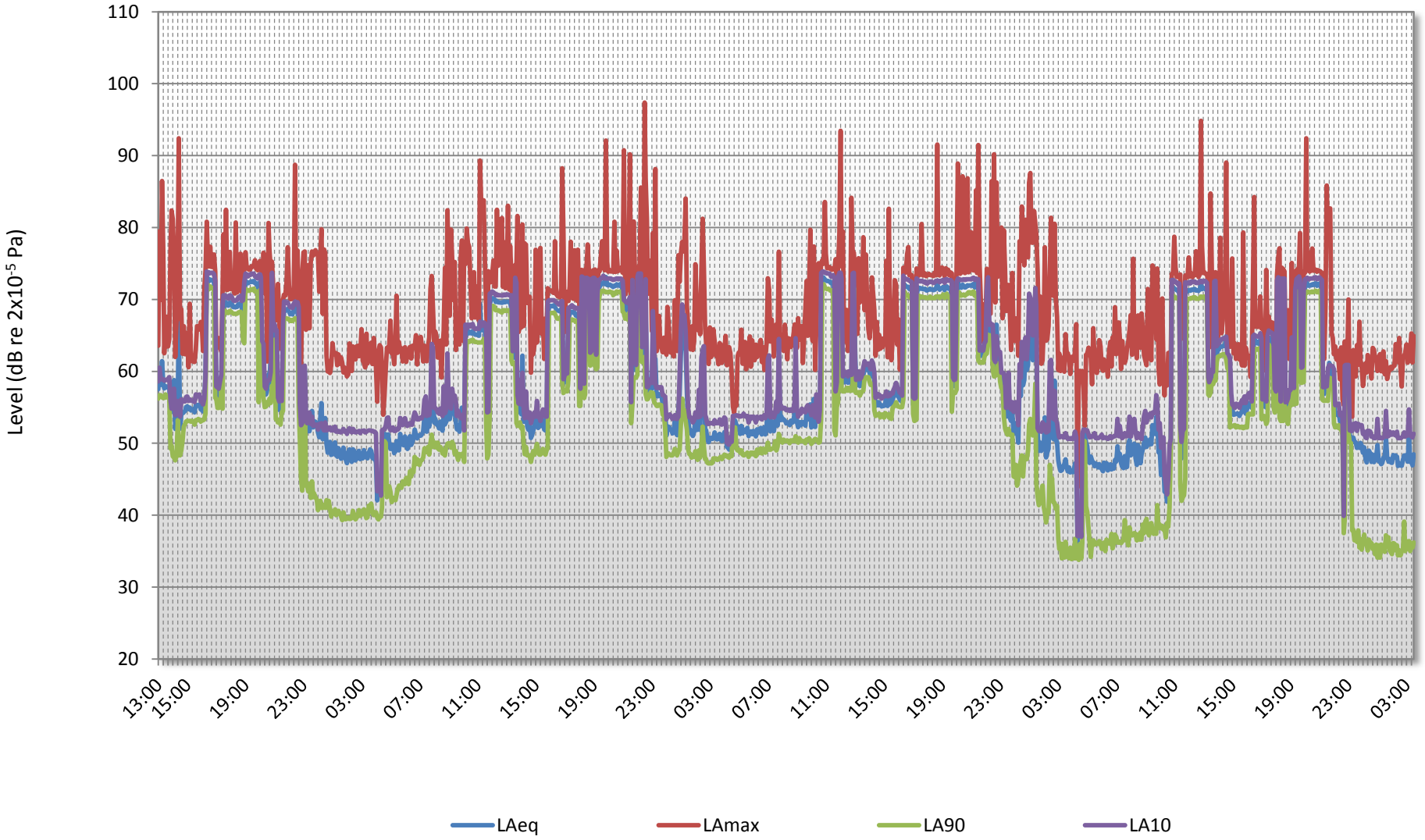
Roysia House, John Street, Royston - Position 1

Environmental Noise Time History
7 December 2017 to 11 December 2017



Roysia House, John Street, Royston - Position 2

Environmental Noise Time History
7 December 2017 to 11 December 2017



APPENDIX A

GLOSSARY OF ACOUSTIC TERMINOLOGY

dB(A)

The human ear is less sensitive to low (below 125Hz) and high (above 16kHz) frequency sounds. A sound level meter duplicates the ear's variable sensitivity to sound of different frequencies. This is achieved by building a filter into the instrument with a similar frequency response to that of the ear. This is called an A-weighting filter. Measurements of sound made with this filter are called A-weighted sound level measurements and the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq}. The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for not more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise

L_{90}

This is the level exceeded for not more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 10 such octave bands whose centre frequencies are defined in accordance with international standards.

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than one alone and 10 sources produce a 10dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3dB for each doubling of distance.

Subjective impression of noise

Sound intensity is not perceived directly at the ear; rather it is transferred by the complex hearing mechanism to the brain where acoustic sensations can be interpreted as loudness. This makes hearing perception highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a reasonable guide to help explain increases or decreases in sound levels for many acoustic scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud
20	About 4 times as loud

Barriers

Outdoor barriers can be used to reduce environmental noises, such as traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and its construction.

Reverberation control

When sound falls on the surfaces of a room, part of its energy is absorbed and part is reflected back into the room. The amount of reflected sound defines the reverberation of a room, a characteristic that is critical for spaces of different uses as it can affect the quality of audio signals such as speech or music. Excess reverberation in a room can be controlled by the effective use of sound-absorbing treatment on the surfaces, such as fibrous ceiling boards, curtains and carpets.