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| 6 | IEQ | 6.7 ACOUSTICS AND NOISE | |
| | | IEQ 18 ROOM ACOUSTICS | |
| | EXCLUSIONS | Buildings/premises where speech intelligibility is not important, and rooms of a special acoustical nature. | 1 |
| | OBJECTIVE | Improve the acoustical properties of rooms in which speech intelligibility is important. | |
| | CREDITS ATTAINABLE | 1 | |
| | PREREQUISITES | None. | |
| | CREDIT REQUIREMENT | 1 credit for demonstrating that internal noise levels are within the prescribed criteria and the mid-frequency reverberation time in applicable rooms meets the prescribed criteria for give types of premises. Based on the nature of the building, relaxation should be allowed in considering the acceptance of this credit. The applicant should provide full submission of the design and calculation to justify the relaxation. | |
| | ASSESSMENT | There is no single all-encompassing set of criteria that will define good acoustical properties for all types of rooms and uses. The Client shall define the criteria appropriate to the type and use of the premises/rooms in the building. The criteria for intruding noise level will be expressed in terms of NC level. However, for the purposes of assessment account should be taken of the criteria given below. Where alternative criteria are used the Client shall provide evidence as to the suitability of the alternative, e.g. by making reference to authoritative guidance. Likewise, where criteria appropriate to the type and use of premises/spaces are not stated herein, the Client shall provide evidence as to the suitability of the criteria adopted. Mid-frequencies refer to 500Hz, 1kHz and 2kHz. The internal noise sources include air conditioning units, breakout noise from air ducts, air grills, etc. Compliance shall be demonstrated by detailed calculations, or measurement, or both, depending on the Client's preference. The reverberation time shall be assessed using Sabine's formula [1] or similar alternative taking into account the room details and appropriate assumptions about the materials in the space. Measurements during commissioning shall use the method given in ISO 3382 [2] or equal equivalent. The Client shall submit details in the form of a report prepared by a suitably qualified person providing a schedule of the premises and spaces in the building, relevant design details as their impact on acoustical properties, the rooms/premises subject to field tests or for which detailed calculations have been made, the acoustical criteria used, underlying assumptions, and the results of tests or calculations demonstrating compliance with the criteria. Where it can be demonstrated that the acoustical quality in a sample of each type of room in which speech intelligibility is important, as measured or calculated, meets appropriate performance criteria the credit shall be awarded. | 2 3 4 5 6 |
| | PERFORMANCE | a) Office type premises | |
| | CRITERIA | The reverberation time of A-weighted sound pressure level, in modular (private) offices and conference rooms, shall be 0.6 s or below. The | 7 |

1 I.Sharland. Woods practical guide to noise control. Colchester, England.

2 International Standard Organization. ISO 3382. Acoustics - Measurement of the reverberation time of rooms with reference to other acoustical parameters.

noise assessment criterion shall be NC40.

b) Classrooms and similar premises

The reverberation time of A-weighted sound pressure level in teaching rooms, other than specialist teaching rooms such as laboratories and workshops, shall be 0.6 s or below. The noise assessment criterion shall be NC 35.

c) Residential premises, hotel and apartments

The reverberation time of A-weighted sound pressure level, in bedrooms and living rooms, shall be between 0.4 and 0.6 s. The noise assessment criterion shall be NC 30.

d) Indoor games halls & indoor swimming pools etc

The reverberation time of A-weighted sound pressure level, in indoor game halls, indoor swimming pools or other recreational premises, shall be 2.0 s or below. The noise assessment criterion shall be NC 45.

Criteria from standards and guides from authoritative sources should be referenced. For example, Table 8 of BS 8233 [3] provides a guide to reverberation time in unoccupied rooms for speech and music.

BACKGROUND

A first step in architectural acoustic design is to identify appropriate values of reverberation time for the intended use of a room and then to specify materials to be used in the construction which will achieve the desired value of the reverberation time for a given space and use.

The focus for BEAM is on the acoustical qualities in workplaces such as offices and classrooms, libraries, and places of residence, etc. Whilst the matter of room acoustics is complex, and defining performance by a single indicator is problematic, an important acoustical measurement is the reverberation time. It is used to determine the decay rate of sound in a room, and offers a relatively simple assessment of acoustical design.

BEAM is not intended to replace design standards. It sets criteria for good acoustical quality while the design guidelines and standards established in other countries can also be considered.

Whilst reverberation time continues to be regarded as a significant parameter, other types of measurements are needed for a complete evaluation of acoustical quality of rooms. With respect to the standards and guides recommendations, ANSI [4] suggests the maximum reverberation time of A-weighted sound pressure level in classrooms and similar learning spaces. However, for office type premises, residential premises, hotels and apartments there seems to be little available in the way of standards or guides. ASTM [5] gives an alternative parameter, speech privacy in open offices, for an average speech spectrum using the Articulation Index Method.

3 British Standards Institution BS8233:1999 – Sound insulation and noise reduction for buildings – Code of Practice.

4 American National Standard ANSI S12.60-2002.

5 ASTM International. Designation E1130-02. Standard Test Method for Objective Measurement of Speech Privacy in Open Offices Using Articulation Index.

EU 9 Energy Efficient Appliances

EU 10 Testing and Commissioning

EU 12 Metering and Monitoring

Water Use

WU P1 Water Quality Survey

WU P2 Minimum Water Saving Performance

WU 1 Annual Water Use

WU 5 Water Efficient Appliances

Indoor Environmental Quality

IEQ P1 Minimum Ventilation Performance

IEQ 1 Security

IEQ 2 Plumbing and Drainage

IEQ 4 Waste Disposal Facilities

IEQ 5 Construction IAQ Management

IEQ 6 Outdoor Sources of Air Pollution

IEQ 7 Indoor Sources of Air Pollution

IEQ 9 Increased Ventilation

IEQ 10 Background Ventilation

IEQ 11 Localised Ventilation

IEQ 12 Ventilation in Common Areas

IEQ 14 Thermal Comfort in Naturally Ventilated Premises

IEQ 15 Natural Lighting

IEQ 16 Interior Lighting in Normally Occupied Areas

IEQ 17 Interior Lighting in Areas Not Normally Occupied

IEQ 18 Room Acoustics

#107. IEQ 18, 19, 20 & 21, For BEAM Plus New Buildings Version 1.1 and 1.2, what is the definition of "suitably qualified person" (SQP)?

Suitably qualified person (SQP) is a professional who possesses the following qualification:

- a corporate member of HKIOA; or
- a corporate / certified / full member of other International Acoustic Institution; or
- a member of HKIE (Building Services, Mechanical or Environmental discipline) with relevant experience in Acoustic / Vibration Design. SQP should be responsible for the endorsement of the calculation and/or on-site measurement report.

(Released on 29 November 2019)

#108. IEQ 18, For BEAM Plus New Buildings Version 1.1 and 1.2, how should the representative sampling points be selected?

The sampling points should be selected based on the type, use and typical configuration of premises/rooms in the building. Additionally, the internal noise sources such as air conditioning units, breakout noise from air ducts, air grills, etc., should also be considered. The selected sampling points should be endorsed by an SQP.

(Released on 29 November 2019)

IEQ 19 Noise Isolation

IEQ 20 Background Noise

IEQ 21 Indoor Vibration