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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

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Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



DRAFT International Standard

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Acoustics — Design process for the acoustic environment of buildings

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 2, *Building Acoustics*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Acoustic quality plays a critical role in the health, well-being, and productivity of building occupants. Despite this, many buildings around the world exhibit poor acoustical performance—often significantly below acceptable levels. Occupant satisfaction surveys conducted in over 1,000 buildings globally by the Center for the Built Environment (CBE) at the University of California, Berkeley, consistently show that acoustics is the only indoor environmental quality (IEQ) factor rated negatively on average.

As buildings are ultimately designed to support people and their activities, acoustics must be integrated into the design process from the outset. However, doing so requires a structured methodology. Acoustic performance interacts with virtually every other design domain, including structural systems, HVAC (Heating, Ventilation, and Air Conditioning), MEP (Mechanical, Electrical, and Plumbing), materials selection, and spatial configuration. These interdependencies add complexity to acoustical planning and highlight the need for a coherent and adaptable design framework.

This standard is intended to address that complexity by providing a systematic, multi-stage process to support acoustical integration throughout the building lifecycle.

This document is intended to address this complexity, and is intended for all construction stakeholders,

- architects, engineering and design offices, construction companies,
- clients, and representatives of occupants and users,
- acoustic professionals.

It offers them a common framework to facilitate their exchanges and their joint work, during all phases of the project, from the initial expression of the intention to build, until the delivery of the building.

Acoustics — Design process for the acoustic environment of buildings

1 Scope

This document presents an integrated process for addressing the acoustical design of spaces in both new buildings and retrofits. The framework introduces acoustical considerations for architectural and engineering purposes and outlines a design process flowchart applicable to all project phases.

This document emphasizes the importance of functional acoustical objectives (e.g., noise and vibration control for comfort, communication, privacy) in the design of buildings. It also introduces acoustical strategies to achieve these acoustical objectives by targeting acoustic criteria and improving the acoustical outcome.

Collaboration among stakeholders is central to the design process, and the framework identifies key responsibilities of an Acoustical Professional. The following document provides content and a framework that:

- integrates acoustics into the process of design through a step-by-step flowchart aligned with phases of the project,
- references methodologies to assess proposed design solutions for meeting acoustical objectives.

This document examines acoustical, noise and vibration design processes and decisions for various buildings and spaces such as: corporate, office, education, hospitals, housing and residential, mixed-use buildings, retail, government, industry, hospitality, churches, restaurants, courtrooms, theatres, concert halls, performance centres, recreational and sports facilities.

This document does not include technical requirements, such as specific acoustic criteria for different acoustic metrics.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1 acoustical professional

professional that is competent in the field of acoustics—whereby ‘competent’ is understood to be measured in terms of experience, academic study and/or certification (as recognized by the governing authorities in the local jurisdiction)

Note 1 to entry: There are various specializations within the field of acoustics (e.g., architectural acoustics, environmental noise), and sub-specializations about specific subjects (e.g., sound insulation, absorption, impact noise, vibration).

3.2

acoustic

subject that has quantitative properties

EXAMPLE Radiation, propagation, diffraction, impedance, admittance, absorption, reflectivity, sound power, energy, wave, medium, signal, conduit, absorptivity, transducer.

3.3

acoustical

subject that has qualitative properties

EXAMPLE Society, standards, method, engineer, school, glossary, symbol, problem, treatment.

3.4

acoustical environment

features of a space that affects the behavior of sound as it propagates (including decay, reflection, diffraction, diffusion, transmission). The term can be used to describe both architectural and environmental spaces.

3.5

acoustical treatment

materials, assemblies or products that can be used to change the behavior of the acoustical environment. This can be achieved by affecting the absorption, reflections, diffractions, diffusion, and transmission of sound in space.

Note 1 to entry: Text of the note.

3.6

noise

Note 1 to entry: In psychometrics (i.e., psychoacoustics), noise is understood as 'unwanted sound'. Some types of noise may have harmful or undesirable auditory and/or non-auditory effects on health.

3.6.1

airborne noise

acoustic energy propagating through air (i.e., sound) that is perceived to be objectionable to human beings, that may cause annoyance or discomfort

3.6.2

background noise

aggregate of ambient sounds present in an environment generally agreeing the definition for residual sound (and sometimes total sound) per ISO 1996-1. Although it is often labelled as 'noise,' it does not necessarily elicit an objectionable response from occupants as it is an omnipresent aspect of everyday life.

3.6.3

environmental noise

aggregate of intrusive sounds from natural or human-made sources that intrude into an environment. Typically labelled as 'noise,' it may provoke varying responses depending on factors such as intensity, frequency, duration, and context.

3.6.4

structure borne noise

acoustic energy that travels through solid materials, such as building structures or mechanical components, before radiating into the air as audible noise

Note 1 to entry: Generated by sources like vibrating machinery or impacts, structure borne noise propagates through floors, walls, or building elements (e.g., pipes, ducts), often causing audible disturbances in locations distant from the source.

3.7 building services

Note 1 to entry: The aggregation of the equipment, systems, and infrastructure necessary for ensuring the functional performance of buildings, focusing on occupant comfort, safety, and operational efficiency. These services include mechanical, electrical, and plumbing systems (MEP) alongside other essential installations, such as elevators, escalators, and specialized equipment, which collectively support the building's intended use.

3.7.1 HVAC Heating, Ventilation, and Air Conditioning

system or set of technologies responsible for mechanical systems providing heating, ventilation, and air conditioning within buildings. HVAC systems control indoor thermal comfort, air quality, and humidity through equipment such as air handlers, heat pumps, ductwork, and exhaust fans, ensuring a comfortable and healthy environment.

3.7.2 MEP Mechanical, Electrical, and Plumbing

integrated design and implementation of mechanical, electrical, and plumbing systems within a building. MEP encompasses essential infrastructure for heating, cooling, power distribution, lighting, water supply, and waste management, which work together to support building functionality, safety, and occupant comfort.

3.8 masking effect

in acoustics and psychoacoustics referring to the phenomenon where the presence of one sound (the masker) reduces the audibility or perceptibility of another sound (the target) by obscuring or blending with it. Physically, masking occurs when sounds share similar frequency ranges, effectively obscuring quieter sounds. But, beyond physics, psychophysiological studies of hearing show that a sound (the masker) can mask (totally or partially) sounds with frequencies greater than or equal to the frequencies of the masking sound.

This effect can overlap unwanted or intrusive sounds, but can also obscure or blind useful sound, like for example the speech of the orator. Properly used, to mask disturbing noises and promote the perception of useful noises, this effect contributes to an overall acoustically comfortable space.

Note 1 to entry: The term “masking effect” is separate from “sound masking”. The first refer to the phenomenon, and the latter is generally used in reference to the application of electronically generated masking sound from a sound masking system.

3.9 acoustical comfort

qualifies the perceptual experience of the ambient acoustic environment—whether the environment is calm or chaotic, pleasant or annoying, vibrant or monotonous, eventful or uneventful—as it relates to the properties of sound (temporal, spectral and spatial)

3.10 speech communication

extent to which speech is intelligible and clear. More advanced assessments may look into comprehension, rather than intelligibility of speech.

3.11 speech privacy

the extent to which speech is not intelligible. It may also be used to infer a measure of distraction.

3.12 speech security

higher levels of speech privacy, where reduced levels of intelligibility are completed with degrees of inaudibility of speech

Note 1 to entry: Speech security is not practically achievable between locations in open-plan spaces.

4 Design Process

While Life Cycle Analyses (LCA) generally assess the environmental impact of construction of a ‘product’ (herein, the building), the same fundamentals can be relied on to meet additional goals (e.g., health and wellbeing of occupants and efficiency or performance of the activities housed in the building). The design process is a critical phase in the building’s life, which should consider—and can affect—the operation and maintenance (O&M) and decommissioning of the facilities. The following section organizes considerations relevant to acoustics.

More specifically, the acoustical design process should be viewed as the systematic division of the project into smaller parts. The organization of information into stages allows for a holistic approach that integrated acoustical solutions, as needed, to meet the acoustical objectives for various spaces within the building. See [Figure 1](#). Each of the following sections are dedicated to a stage in the design process, describing the analysis and evaluation of project information.

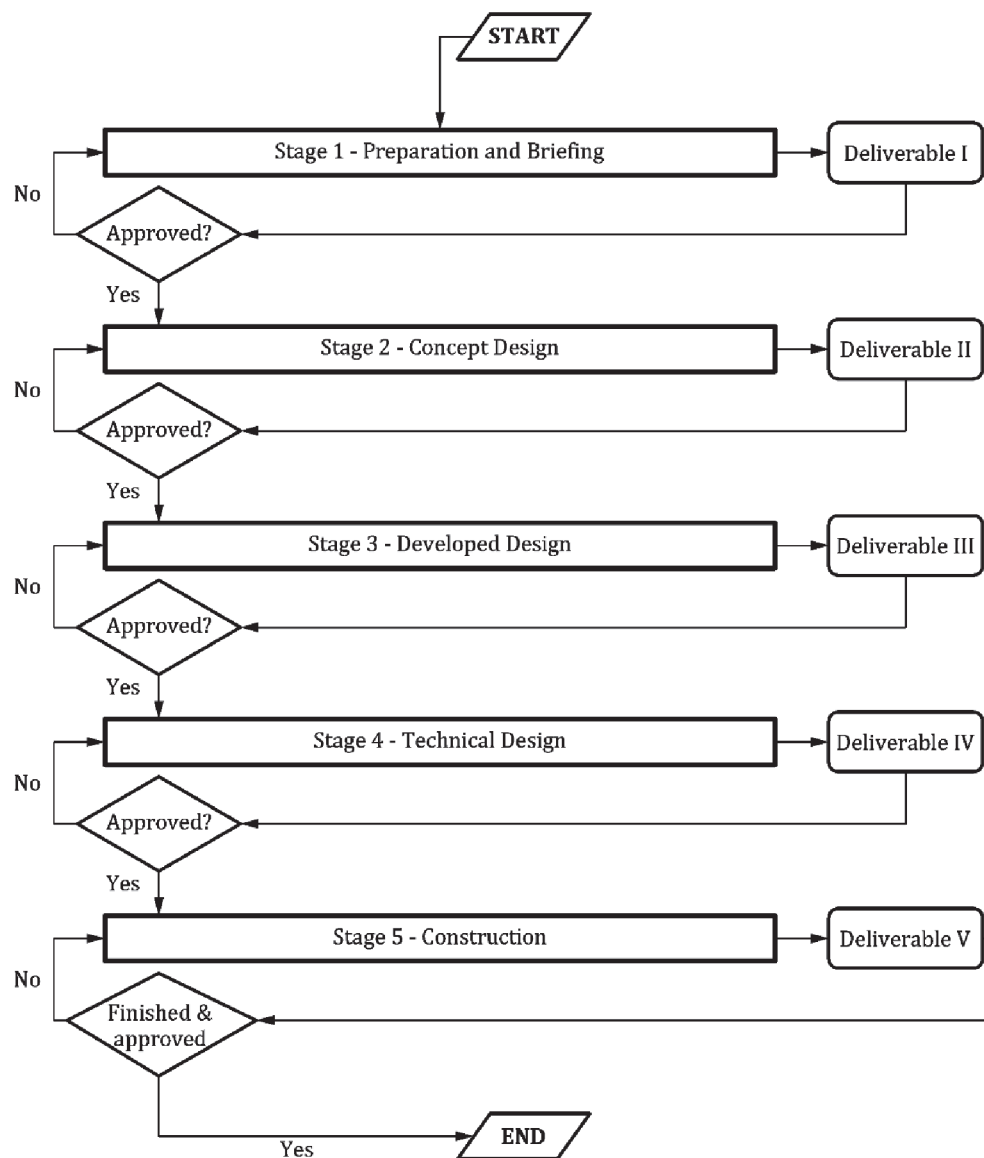


Figure 1 — Summary view of the five stages of the design process

4.1 Stage 1 – Preparation and Briefing

This stage is, sometimes, also referred to as “pre-design” or “research”.