BUREAU OF INDIAN STANDARDS

AGENDA

Panel for Acoustics, Sound Insulation and Noise Control, CED 46:P15 : **Fifth Meeting**

Wednesday, 20 March 2024 : **1430 h**

In Hybrid Mode from:

Dr Lal C Verman Conference Hall, Bureau of Indian Standards, Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110 002

&

Online using:

1) Meeting link:
https://bismanak.webex.com/bismanak/j.php?MTID=m24b72527eaa49d66e8b49849386e9ede
2) Meeting number: 2514 246 1153
3) Password: Nbc@2025

****

Convener: Shri Gautam Suri

NBC Officer: Shri Shubham Chaudhary
Head (NBC Cell): Shri Arunkumar S.

****

Item 0 OPENING REMARKS

Item 1 CONFIRMATION OF MINUTES OF THE LAST MEETING

1.1 The Minutes of the fourth meeting of the Panel held on 23 December 2015 in New Delhi, were circulated vide BIS DG letter No. CED 46:P15/A-2.4 dated 08 February 2016. No comments have been received.

The Panel may **CONFIRM** the Minutes.

Item 2 COMPOSITION

2.1 The present composition of the Panel as reconstituted by the National Building Code Sectional Committee, CED 46 is given at **Annex 1 (P- 9)**.

The Panel may **CONSIDER**.

2.2 Request for Co-option has been received in 2016 from M/s Saint Gobain India Pvt. Ltd. (*from their Mr. Manit Ramaiya, Senior Concept Development Manager*) for representation on the panel.

The Panel may **CONSIDER**.

2.3 The Panel may also **NOTE** regarding the Structural Reforms in Standardization established by BIS to bring greater efficiency in standards formulation and revision work in BIS addressing speed, skill and scale. The same relates to aspect like:

a) technical committees of BIS having members with widely acknowledged domain area expertise and experience on the subjects
b) optimum size of the technical committee
c) review of membership with focus on continuity of participation including contribution by every member
d) holding periodic meetings (physical/virtual/hybrid)
e) decide on timelines to enable stage-wise development of the documents (draft standards)
f) resource centre to enable share the information and documents associated with the standardization work

2.4 Further, BIS has established in place systems such as action research projects, R&D for standards development and provision for having short-term Consultants. Also, focus should be made w.r.t developments on the subject happening world-wide including in technical events, literature, research publications, standard bodies, etc. Wherever possible research based inputs be generated including by associating with the various eminent institutions with whom BIS has entered into MoU with (List of MoU institutions is available at: https://www.bis.gov.in/partnership-with-technical-and-professional-institutions/).

The Panel may **NOTE**.

Item 3 PROJECT OF REVISION OF NBC

3.1 Under the project of Revision of NBC, various Parts/Sections of NBC 2016 [a list of which is given in **Annex 2 (P-11)**] are being comprehensively revised, to bring out a most modern and state-of-the-art revision of the Code.

The Panel may consider revising the chapter (**Part 8 / Sec 4** on **Acoustics, Sound Insulation and Noise Control**) taking into cognizance the latest developments in the field. In the revision exercise, due consideration may be given to ensuring coherence among various chapters of the Code. Where required, suggestions for improvements in the other chapters of the code may also be provided.

The Panel may **NOTE**

3.2 The Panel may therefore engage in a high-level review of the existing chapter covering Building Services namely ‘Acoustics, Sound Insulation and Noise Control’. The contents of existing Part 8 / Sec 4 ‘Acoustics, Sound Insulation and Noise

Control' is given in **Annex 3 (P-13)**. This review may involve an examination of the structure, content, and alignment of the chapters with current industry standards and practices.

The Panel may **CONSIDER.**

3.3 To facilitate the revision process, the following working draft has been prepared and circulated to the members for their comments vide our email dated 12 March 2024:

Working Draft of National Building Code of India: Part 8 Building Services, Section 4 Acoustics, Sound Insulation and Noise Control, Doc: CED 46 (0277)WD

Comments received on the draft would be circulated (separately) among the members and also discussed during the meeting.

The Panel may **CONSIDER.**

3.4 The standards formulated by BIS under the Functional Requirements In Buildings Technical committee, **CED 12**, related to the Acoustics, Sound Insulation and Noise Control chapter are given in **Annex 4 (P-15).**

Item 4 COMMENTS RECEIVED ON / INPUTS RELATED TO PART 8 / SEC 4 'ACOUSTICS, SOUND INSULATION AND NOISE CONTROL' OF SP7 : 2016

4.1 The following comments were received on the above Chapter of NBC 2016 from M/s Saint-Gobain India Pvt. Ltd. – Gyproc Business:

Clause/ Para/ Table/ Figure No.	Comments/Modified Wordings	Justification of Proposed Change
7.3.4.1	Indoor noise levels should not exceed 30 dB LAeq in hospital ward rooms where patients are being treated or observed.	[IS 1950:1962 Table 4 says 40 dB to 50 dB noise is acceptable. Which needs to be amended to LAeq 30 dB [WHO community noise guidelines Para 4.3.3]
7.3.4.2	Some porous materials have very good sound absorption properties. Materials should provide sound absorption of at least Class A (NRC 0.9) in noise producing areas and minimum Class B (NRC 0.7) in other areas. A maximum RT of 0.6 seconds is permitted in hospital wards. When covered with a perforated sheet metal facing, can be used in most	NRC 0.9 in noise sensitive areas and NRC 0.7 in other areas are required to ensure proper communication and less indoor noise level. [IS 1950:1962 6.1.4 needs amendment.] [To achieve LAeq 30 inside hospital wards, a RT 30 of 0.6 seconds – "Hospital noise and its effect on staff –Timothy Y.Hsu,

	areas requiring washable acoustical treatment.	ASA 159th meeting" ISO 11654 "Sound absorbers for use in buildings"
8.3.2.1	The reverberation time should not exceed 1.0 s in all general offices of the types listed in 8.3.2.2 to 8.3.2.6. In small private offices, the reverberation time should not exceed 0.75 second, in very large offices the reverberation time may be increased to 0.8 second. For canteens, the recommended maximum reverberation time is 0.75 second. For this purpose, a Class A (0.9 NRC) ceiling is recommended.	International organizations such as ISO and ASTM have established the incompleteness of using RT to measure the acoustic environment of an office. They recommend the STI and Spatial Decay as replacement parameters since they are most suitable for open offices. [USGBC Leed V4: RT for Open office] ISO 11654 "Sound absorbers for use in buildings" [WHO community noise guidelines Para 4.2.6: Effects on performance] [IS 2526.1963 10.2: Requires amendment. Details provided in USGBC Leed V4 can be taken as reference] We propose Class NRC ceiling to reduce RT and improve clarity of speech and reduce indoor noise levels.
8.3.2.4	A new concept in office planning is the use of open plan offices. Large open floor spaces are converted into an office area with senior executives, junior executives and secretarial staff all seated within the same area without the use of any partitions or walls. While this method of planning is appreciated, it leads to a problem of inadequate acoustical privacy between adjacent work spaces. Open plan offices with good acoustic conditions are rare, but an example of target values could be Spatial Decay $D2,S \geq 7$ dB, A weighted SPL at 4 meters from sound source $Lp,A,S,4\ m \leq 48$ dB, and Distraction Distance of $rD \leq 5$ m. Ceilings to have Articulation Class (AC) value of min. 180 (It is a classification of ceilings in accordance with their ability to contribute to privacy in open-plan offices) For this purpose, a Class A (0.9 NRC) ceiling is recommended. The final subjective outcome will be improved levels of privacy and lower distraction due to speech.	[IS 2526:1963 Figure 1: For large areas where speech is important, RT should not exceed 1.1 seconds] "[ISO 3382-3 Annex A: Example of Target values] ISO 11654 "Sound absorbers for use in buildings" [USGBC Leed V4: RT for Open office] [WHO community noise guidelines Para 4.2.6: Effects on performance] Articluation Class of min. 180 as per ISO 3382-3 " We propose Class A NRC ceiling to reduce RT and improve clarity of speech and reduce indoor noise levels.

8.3.2.6, 8.3.2.7, 8.3.2.8, 8.3.2.9	Banking Halls, Public Spaces, Canteens and Circulation Spaces 8.3.2.6 If banking halls are large and lofty, noise nuisance tends to be aggravated. Class A ceilings that provide sound absorption of at least NRC 0.9 at mid and high frequencies are advisable. 8.3.2.7 Public offices and waiting spaces Noise nuisance may be minimized by the provision of resilient flooring, high performance Class A ceilings that provide sound absorption of at least NRC 0.9. 8.3.2.8 The provision of high performance Class A ceilings that provide sound absorption of at least NRC 0.9 at mid and high frequencies. It is also recommended that the kitchen, washroom and sink are separated from the canteen by a partition wall providing insulation of Rw 50 at least. Reverberation Time in canteen should be a maximum of 0.75 seconds (For small-mid size cafeterias - upto 5000 sq.ft) and 0.75-1 seconds (for mid-large size cafeterias above 5000 sq.ft.)	[IS 2526:1963 Figure 1: For large areas where speech is important, RT should not exceed 1.1 seconds] We propose Class NRC ceiling to reduce RT and improve clarity of speech and reduce indoor noise levels. ISO 11654 “Sound absorbers for use in buildings”

The Panel may **CONSIDER**.

4.2 The following comments were received on the above Chapter of NBC 2016 from M/s Ashok B. Lall Architects and Global Buildings Performance Network(GBPN):

	DETERMINANTS OF HEALTH	**ACTIONS FOR HEALTHY BUILDINGS AND NEIGHBOURHOODS**	**NATIONAL BUILDING CODE (NBC)**	
			Proposed Recommendations	**Existing Provisions**

1.	**Protection from Diseases and Pollutants**	Protected from loud noise of traffic orother sources of loud noise.	Minimum buffer between land for affordable housing and major transportation arteries to minimise pollution	PART 8, NBC 2016	**5.2.1** The most desirable method is to locate the residential buildings in a quiet area away from the noisy sources like the industrial areas, rail tracks, aerodromes, roads carrying heavy traffic, etc. **5.2.1.1** To minimise ground reflection, the dwellings should be surrounded by the maximum amount of planting and grassed areas and the minimum amount of hard surfacing. This applies particularly to high density areas. Where for maintenanc

					e reasons a large amount of hard paving is necessary, it should be broken up by areas of planting and grassing. Narrow hard paved courts should be avoided between adjacent tall buildings.

The Panel may **CONSIDER**.

Item 5 PROJECT OF PROMOTION OF USE OF NBC 2016 IN ALL STATES AND UTs OF INDIA

5.1 An ambitious Project for Promotion of use of National Building Code of India 2016 in all States and UTs of India was earlier taken up by BIS involving a comprehensive study and review of rules and regulations governing land development and building construction in various states and union territories of India. The Project involves preparing draft regulations which are aligned with provisions in National Building Code of India 2016 (NBC 2016), for use by the States and UTs in revising their existing regulatory documents in line with the revised state-of-the-art NBC 2016. The Project had 09 deliverables as below:

Sl No.	Deliverable
1	Compilation and study of existing processes, rules and regulations as existing in various States and UTs which govern the land development and building construction, and other statutory provisions which have to be complied with currently, etc
2	Classification of the Provisions in various Rules and Regulations as mandatory/recommendatory, identification of commonalities/dissimilarities, conflicts, if any

3	Mapping the existing Rules, Regulations, Processes against provisions given in NBC 2016
4	Identification of other best practices which may currently not be a part of the existing rules or of NBC 2016, which may be aspirational but will help further the Aim/Objective of this project
5	Preparation of a draft revised standardized/model Rules and Regulations aligned with the provisions of NBC 2016, for the consideration of the Bureau
6	Preparing State/UT-wise standardized/model regulatory documents, including such required documents for some metro/mega cities, which can be adopted by various authorities & obtaining approval of the Bureau as per scope of work
7	Creating pamphlets for an awareness campaign for general public
8	Creating a simplified booklet on using NBC which can be used by all stakeholders-academicians, students and professionals
9	Dissemination to designated States/UTs, the knowledge base created and presenting to them advantages of adopting the same through meetings and workshops

With the support of an external consultant, the main deliverable namely Draft Development and Building Regulations for each of the States and UTs of India was prepared. Followed by 20 number of 2-day workshops covering all the States and UTs, the inputs received as part of such workshops, the finalized regulations were shared with the respective States & UTs.

In addition, a new special publication, **SP 73 : 2023 'Standardized Development and Building Regulations, 2023'** was also published and released, which is available for access (free download) from the BIS' website and from: https://standardsbis.bsbedge.com/

The Panel may **NOTE.**

Item 6 DATE & PLACE OF THE NEXT MEETING

Item 7 ANY OTHER BUSINESS

****

ANNEX 1
(*Item* 2.1)

COMPOSITION OF THE PANEL FOR ACOUSTICS, SOUND INSULATION AND NOISE CONTROL, CED 46:P15

Sl No.	NAME OF THE ORGANISATION	REPRESENTED BY
1.	In Personal Capacity, Noida	Shri Gautam Suri (***Convener***)
2.	All India Radio, New Delhi	Ms Anuradha Aggarwal Shri S Hyder (Alternate) : Superannuated
3.	Central Public Works Department, New Delhi	Shri A.K. Sharma Shri Saju Siddtharthan (Alternate)
4.	CSIR-Central Building Research Institute, Roorkee	Shri Soraj Kumar Panigarhi Shri Anup Kumar Prasad (Alternate I) Shri Kanti Lal Solanki (Alternate II)
5.	CSIR-National Physical Laboratory, New Delhi	Dr Naveen Garg Dr Chitra Gautam(Alternate)
6.	Indian Institute of Science, Bengaluru	Prof M. L. Munjal
7.	Indian Institute of Technology Kharagpur, Kharagpur	Dr A. R. Mohanty
8.	Indian Institute of Technology Madras, Chennai	Prof S. Narayanan Prof P. Chandramouli (Alternate)
9.	Indian Institute of Technology Roorkee, Roorkee	Dr E. Rajasekar
10.	Lloyd Insulations (India) Pvt Ltd, New Delhi	Shri N. Srinivas Shri Umesh Khanna (Alternate)
11.	Military Engineer Services, E-in-C's Branch, Army HQ, New Delhi	Shri P.K. Jain Col. N. Chakraborty (Alternate)
12.	P. S. Subramanian Associates, Chennai	Dr S. Kandaswamy Dr P. Senthil Kumar (Alternate)
13.	School of Planning and Architecture, New Delhi	Prof Shuvojit Sarkar
14.	The Indian Institute of Architects, Mumbai	Shri B. Sudhir Shri Vikas Dubey (Alternate I) Shri Shital Prashant Nemane (Alternate II)

15.	The Institution of Engineers (India), Kolkata	Er. P K Adlakha

ANNEX 2
(*Item* **3.1**)

Details of Chapters of NBC 2016

Part/Section		*Title*
1	**PART 0**	**INTEGRATED APPROACH – A PRE-REQUISITE FOR APPLYING THE PROVISIONS OF THE CODE**
2…….	**PART 1**	**DEFINITIONS**
3……..**PART 2**		**ADMINISTRATION**
4……..**PART 3**		**DEVELOPMENT CONTROL RULES AND GENERAL BUILDING REQUIREMENTS**
5……..**PART 4**		**FIRE AND LIFE SAFETY**
6……..**PART 5**		**BUILDING MATERIALS**
	PART 6	**STRUCTURAL DESIGN**
7……	Section 1	Loads, Forces and Effects
8……	Section 2	Soils and Foundations
	Section 3	Timber and Bamboo
9……	3A	Timber
10……	3B	Bamboo
11……	Section 4	Masonry
	Section 5	Concrete
12…… ……	5A	Plain and Reinforced Concrete
13…… ……	5B	Prestressed Concrete
14…….....Section 6		Steel
	Section 7	Prefabrication and Systems Building and Mixed/Composite Construction
15……7A		Prefabricated Concrete
16……7B		Systems Building and Mixed/Composite Construction
17..... Section 8		Glass and Glazing
18……	**PART 7**	**CONSTRUCTIONAL PRACTICES AND SAFETY**
	PART 8	**BUILDING SERVICES**
19……	Section 1	Lighting and Ventilation
20……	Section 2	Electrical and Allied Installations
21……	Section 3	Air-conditioning, Heating and Mechanical Ventilation
22……	Section 4	Acoustics, Sound Insulation and Noise Control
	Section 5	Installation of Lifts and Escalators and Moving Walks
23……..		5A Lifts
24…….		5B Escalators and Moving Walks
25.....	Section 6	Information and Communication Enabled Installations

ANNEX 3
(*Item* **3.2**)

CONTENTS OF PART 8 'BUILDING SERVICES'
SECTION 4 ACOUSTICS, SOUND INSULATION AND NOISE CONTROL (OF NBC 2016)

SYSTEM

ANNEX H SUGGESTED EQUIPMENT NOISE DATA SHEET

LIST OF STANDARDS

ANNEX 4
(*Item* **3.4**)

Standards formulated by BIS under the Functional Requirements In Buildings Technical committee, CED 12, related to the Acoustics, Sound Insulation and Noise Control chapter

Sl. No.	IS No.	TITLE	No. of Amds
1	IS 11050 (Part 1) : 2023	Rating of sound insulation in buildings and of building elements: Part 1 Airborne sound insulation	-
2	IS 11050 (Part 2) : 2023	Rating of sound insulation in buildings and of building elements: Part 2 Impact sound insulation	-
3	IS 13735 : 2023	Audible emergency evacuation signal Requirements	-
4	IS 1950 : 1962	Code of practice for sound insulation of non - Industrial buildings	1
5	IS 2526 : 1963	Code of practice for acoustical design of auditoriums and conference halls	1
6	IS 3483 : 1965	Code Of Practice For Noise Reduction In Industrial Buildings	-
7	SP 41 : 1987	Handbook on functional requirements of buildings (Other Than Industrial Buildings)	-
8	IS 4954 : 1968	Recommendations for noise abatement in town planning	-
9	*IS 4963 : 1987	Recommendations for Buildings and Facilities for the Physically Handicapped	-
10	IS 5499 : 1969	Code of practice for construction of underground air - Raid shelters in natural soil	-
11	IS 6074 : 1971	Code of Practice for Functional Requirements of hotels, restaurants and other food service establishments	2
12	IS 6074 : 1971	Code of Practice for Functional Requirements of hotels, restaurants and other food service establishments (Bilingual)	2
13	IS 8827 : 1978	Recommendations for basic requirements of school buildings	-
14	*IS 9736 : 1981	Glossary of terms applicable to acoustics in buildings	-
15	IS 9901 (Part 1) : 1981	Measurement of sound insulation in buildings and of building elements: Part 1 requirements for laboratories	-
16	IS 9901 (Part 2) : 1981	Measurement of sound insulation in buildings and of building elements: Part 2 statement of precision requirements	-

17	IS 9901 (Part 3) : 1981	Measurement of sound insulation in buildings and of building elements: Part 3 laboratory measurements of airborne sound insulation of building elements	-
18	IS 9901 (Part 4) : 1981	Measurement of sound insulation in buildings and of building elements: Part 4 field measurements of airborne sound insulation between rooms	-
19	IS 9901 (Part 5) : 1981	Measurement of sound insulation in buildings and of building elements: Part 5 field measurements of airborne sound insulation of facade elements and facades	-
20	IS 9901 (Part 6) : 1981	Measurement of sound insulation in buildings of building elements: Part 6 laboratory measurements of sound insulation of floors	-
21	IS 9901 (Part 7) : 1981	Measurement of sound insulation in buildings and of building elements: Part 7 field measurements of impact sound insulation of floors	-
22	IS 9901 (Part 8) : 1981	Measurement of sound insulation in buildings and of building elements: Part 8 laboratory measurements of the reduction of transmitted impact noise by floor coverings on a standard floor	-
23	IS 9901 (Part 9) : 1986	Measurement of sound insulation in buildings and of building elements: Part 9 laboratory measurement of Room - To - Room airborne sound insulation of a suspended ceiling with a plenum above it	-

*** INDICATES STANDARDS UNDER REVISION**

****