BUREAU OF INDIAN STANDARDS

MINUTES

Panel for Timber, CED 46:P6 : Fifth Meeting

Thursday, 29 February 2024 : 1030 h – 1500 h

In Hybrid Mode from: The Board Room, Forest Research Institute, Kaulagarh Road, Dehradun Uttarakhand, PO. I.P.E. 248195

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Convener: Shri K.S. Pruthi **Member Secretary:** Shri S. Arun Kumar

NBC Officer: Shri Abhishek Sharma

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PRESENT

Members:

In Online Mode:

1) Shri Punati Sridhar (Bamboo Society of India, Bengaluru)
2) Shri K. N. Murthy (Bamboo Society of India, Bengaluru)
3) Shri Dinesh Kumar Ujjainia (Central Public Works Department, New Delhi)
4) Shri Aman Deep (Creative Design Consultants & Engineers Pvt Ltd, Ghaziabad)
5) Shri Mickey Mecon Dalbehera (CSIR – Central Building Research Institute, Roorkee)
6) Shri Rajesh Bhandari (Forest Research Institute, Dehradun)
7) Shri R. S. Topwal (Forest Research Institute, Dehradun)
8) Shri Rabi Mukhopadhyay (Forum of Scientists, Engineers and Technologists, Kolkata)
9) Dr Parthasarathi Mukhopadhyay (Forum of Scientists, Engineers and Technologists, Kolkata)
10) Dr Deepak Bansal (Housing and Urban Development Corporation Ltd. New Delhi)
11) Ms Pooja Nandy (Housing and Urban Development Corporation Ltd. New Delhi)
12) Dr Dulal Goldar (Indian Association of Structural Engineers, New Delhi)
13) Dr Suresh Bhalla (Indian Institute of Technology Delhi, New Delhi)
14) Shri Anand Nandanwar (Indian Wood Science and Technology, Bengaluru)
15) Dr Narasimhamurthy (Indian Wood Science and Technology, Bengaluru)
16) Smt Neelam Manjunath (Manasaram Architects, Bengaluru)
17) Shri Anil Mutha (Mutha Industries Pvt. Ltd., Maharashtra)

18) Shri Sudip Chakraborty (Mutha Industries Pvt Ltd, Maharashtra)
19) Shri Krishna Kumar (North East Centre for Technology Application and Research, Shillong)
20) Ms Lyngksiar Khongwir (North East Centre for Technology Application and Research, Shillong)
21) Shri Manoj Kumar Singh [The Institution of Engineers (India), Kolkata]
22) Shri Kumar Arvind [The Institution of Engineers (India), Kolkata]
23) Shri Vaibhav Kaley (Wonder Grass Initiative Pvt Ltd, Nagpur)

Physically:
24) Shri Prakash N. Suthar [Windsor Wood (India) Pvt Ltd, Mumbai]

From BIS:

25) Shri Pradeep Singh Shekhawat, Scientist D (Civil Engg)
26) Shri Shubham Chaudhary, Scientist B (Civil Engg)
27) Shri Prashant Yadav, Scientist B (Civil Engg)

Invitees (Physically):

28) Dr Renu Singh, IFS (Forest Research Institute, Dehradun)
29) Shri D. P. Khali (Forest Research Institute, Dehradun)
30) Dr Ajay Thakur (Forest Research Institute, Dehradun)
31) Dr Santan Barthwal (Forest Research Institute, Dehradun)
32) Dr N. K. Upreti (Forest Research Institute, Dehradun)
33) Shri Ajmal Samani (Forest Research Institute, Dehradun)
34) Dr Vikas Rana (Forest Research Institute, Dehradun)
35) Dr Ranjana Negi (Forest Research Institute, Dehradun)
36) Dr Ranjana Yadav (Forest Research Institute, Dehradun)
37) Dr Ashutosh Pathak (Forest Research Institute, Dehradun)
38) Dr Shailendra Kumar (Forest Research Institute, Dehradun)
39) Dr Sachin Gupta (Forest Research Institute, Dehradun)
40) Shri N. S. Mehta (Forest Research Institute, Dehradun)
41) Shri Vishavnath (Forest Research Institute, Dehradun)

Item 0 OPENING REMARKS

0.1 Dr Renu Singh, Director, Forest Research Institute, Dehradun extended a warm welcome to the Convener, members of the Panel and the BIS team to their institute. Dr Singh expressed her appreciation to BIS and the Panel towards taking up the task of revision of NBC and the two chapters on structural design relating to Timber and Bamboo. Citing that NBC is widely implemented in the country and the chapters on timber and bamboo are of significant interest to their institute in which considerable research and industrial studies were carried out and data is available that can be suitably incorporated in the revision of NBC.

Dr Singh mentioned that the materials such as bamboo and wood composites, laminated veneered lumber, trussed rafters, glued laminated timber, which are now

being used as replacement to traditional timber construction would be of immense interest.

0.2 The Convener, Shri K.S. Pruthi expressed his gratitude to the National Building Code Sectional Committee, CED 46 of BIS for reposing faith in him to lead the panel yet again as in the 2005 and 2016 revisions. He welcomed the members and invitees from FRI who have shown tremendous response to this meeting and involving themselves in the revision exercise as part of the Panel for Timber and Bamboo, CED 46:P6. He requested for their active participation in the future as well. Convener mentioned, that the Section 3A of Part 6 of National Building Code, which deals with Timber, was there in the Code since its inception in 1970 and had been substantially improved in all its revisions in 1983, 2005 and 2016. He also mentioned about the major modifications incorporated in the Section in the 2016 revision, such as, inclusion of new timber species, updated provisions on timber connector joints, glued finger joints and glue laminated beams; detailed design provisions on trussed rafters and lamella roofing; new provisions for horizontally laminated beams, etc. He added, that the Section 3B, dealing with Bamboo, was introduced in the NBC 2005 version only, based on the research primarily done by Forest Research Institute, Dehradun. He recollected the work done in the previous (2016) version about the major modifications in the bamboo chapter, such as, updated provisions on bamboo trusses, bamboo foundations, detailed provisions on bamboo panel structures and new provisions for bamboo reinforced concrete and reconstituted wood from destructured bamboo. He mentioned, bamboo reinforced concrete; in which bamboo is used as reinforcement in concrete, as a good, low cost material for expeditious construction of structures with a design life of 15 to 20 years.

Shri Purthi also mentioned latest development in the use of timber including engineered wood needs to be included in this current exercise of revision of NBC based on credible research inputs. The Convener, Shri Pruthi mentioned that with the significant increase in usage of timber and bamboo, including the feedback regarding their performance and maintenance, in this revision the chapters need to capture the essential features to enable the designers and users to opt for sustainable building material which can last for many years when properly maintained.

With these remarks and after a formal introduction of the members present, the Convener suggested to take up the Agenda item wise.

Item 1 CONFIRMATION OF MINUTES OF THE LAST MEETING

1.1 There being no comments on the Minutes of the fourth meeting of the Panel held on 23 October 2015 in New Delhi, sent vide BIS DG letter No. CED 46:P6/A-2.4 dated 03 February 2016 based on which the National Building Code Sectional Committee, CED 46 finalized and published the Code, the Panel confirmed the same, as circulated.

Item 2 COMPOSITION

2.1 The Panel noted its composition as given at Annex 1 to the Agenda, reviewed the same and decided/noted as follows:

a) Shri Ashwath Heggade shall represent Forest Research Institute, Dehradun as the 2nd Alternate representative (Young Professional) of the institute.

b) Shri Gurudayal Saran shall represent M/s Manasaram Architects, Bengaluru as the 2nd Alternate representative (Young Professional) of the firm.

c) To rename IPIRTI to Indian Wood Science and Technology (IWST) in view of merger of the organizations.

d) To seek the interest and co-opt organizations involved in the fire testing and structural testing of timber and bamboo, such as IIT Roorkee, CEPT (Ms. Dhara Shah, Assistant Professor).

e) The Panel decided to co-opt Dr Shakti Singh, Scientist-G from Indian Wood Science and Technology, Bengaluru in the Expert Groups constituted.

f) The Panel also nopted that Ms Lyngksiar Khongwir from North East Centre for Technology Application and Research, Shillong shall be their alternate member.

g) To have Shri N. Mahesh alone representing M/s Iyer and Mahesh Architects, Trivandrum in view of their Shri K. Gangadharan has since deceased.

Item 3 PROJECT OF REVISION OF NBC

3.1 The Panel noted the details of the project of Revision of NBC, the contents in terms of various proposed Parts and Sections being brought out in the revised NBC as given at Annex 2 to the Agenda and the necessity to bring required coherence of these Chapters (Part 6/Section 3A & 3B) with other Chapters of the Code. The Panel also noted that already at appropriate places in the working drafts under consideration, reference to other Parts/Sections of the NBC has been made to ensure that users of these Sections are given holistic information and comprehensive implementation is facilitated.

3.2 The Panel also noted that the information regarding contents of the existing chapters – 3 A Timber and 3B – Bamboo as given in annexes 3 & 4 of the agenda. The Panel considered the suggestions from BIS for addressing in the revision as listed under the item of Agenda. During the meeting, the Panel addressed several crucial topics related to timber and bamboo construction. Participants emphasized on:

a) the need for an integrated approach to enhance fire and earthquake safety in timber structures.
b) local species with inherent fire resistance, fire ratings for timber buildings, and the design of large structural components.

c) blast-proof structures, focusing on resiliency, construction speed, and the use of cross-laminated timber (CLT) with varying layers.
d) Comprehensive works and subgroup formations, particularly in structural design codes, were proposed.
e) The significance of utilizing readily available Indian species and promoting plantation species to reduce the reliance on imported wood products, such as mango and seesham, was emphasized.
f) The fire-resistant nature of round bamboo and the importance of capturing species-level data were highlighted.
g) Additionally, discussions covered the reevaluation of nature, climate change risks, and sustainable aspects related to fuel used (coal) in manufacturing. The meeting underscored the occupancy aspects, favouring plantation and forest species.
h) The role of technologists in promoting faster-growing plantations for sustainability was acknowledged.
i) The focus on bamboo as a mainstream construction material, along with extensive testing across climatic zones, was emphasized. The meeting also referenced relevant International Standards (ISO 22156 : 2021 and ISO 22157 : 2019) and proposed the creation of subgroups for engineered bamboo and bamboo composites.
j) Overall, the discussions aimed to establish guidelines for the structural application of bamboo, considering its strength and potential as a mainstream construction material.
k) Efforts were directed towards working on the top 10 bamboo species, aligning with the Bamboo Society of India (BSI) initiative, and exploring bamboo-based composites.
l) The meeting agreed for a commitment to continuous testing and research across climatic zones to further develop design guidelines.
m) Include the properties of other species of timber and bamboo for inclusion in the respective chapters (3A and 3B) based on the inputs/studies of FRI and IWST since the last revision of the Code.
n) Provisions on cross laminated timber (CLT) up to 8 layers.
o) Provisions relating to bamboocrete.
p) Bamboo composites for inclusion as structural and non-structural members in buildings.
q) Standardized test methods on engineered bamboo and timber wood.

3.3 There was a thorough discussion of the resilience of our indigenous species in constructing wooden buildings of varying heights, referencing Douglas fir and other softwood species. The Convener expressed deep respect for the suggestion that these species outperform others in completed and occupied buildings, citing case studies. The discussion touched upon the efficiency of our species in terms of both volume and fire resistance. The intention is to conduct extensive tests, including CLT and cross-laminated beams, to validate the fire resistance values and ensure the safety of occupants for extended periods. Additionally, the conversation expanded to consider inputs from institutions like the United States' Engineered Wood Products Association (EPA) to gather comprehensive data and finalize building codes for various sectors, including defence. The importance of considering local conditions and materials, especially for mass constructions like

bamboo structures, was highlighted, with a call for comprehensive research and testing to ensure fire safety in these contexts.

A critical viewpoint was presented by Shri Prakash Suthar regarding the availability of natural resources, especially in the context of sustainability and managed forests. The emphasis was on the need for regeneration of nature, as highlighted in the proposed white paper that outlines a grand vision for the future. Shri Suthar underscored the importance of incorporating renewable energy sources, such as solar roofs and electric vehicles, while acknowledging that these efforts alone won't suffice. The central concern raised was the urgent need to address the environmental impact of the extensive development undertaken, considering the current state of climate change. Two pivotal questions were posed:

a) How to manage the existing development in the face of climate change, and
b) How to ensure the survival of infrastructure investments made in a rapidly changing climate.

Shri Prakash Suthar agreed to send a white paper regarding engineered timber, covering therein aspects relating to regeneration of nature, risks due to climate change, carbon sequestration, agro forestry, plantation timber, energy consumption/comparison w.r.t. cement, steel, concrete, plastics.

The discussion urged a collective responsibility to confront these challenges and align development goals with sustainable practices that prioritize the regeneration of nature.

In the insightful discussion at the Forest Research Institute in Dehradun, the focus remained on the challenges surrounding forest health and its impact on timber and bamboo utilization, as highlighted by one of the members. The member emphasized the degradation of forest health, particularly in terms of wood decay in anaerobic conditions, leading to the release of methane and other harmful oxides. The critical role of sustainable practices, plantation species, and the development of new timber species was highlighted. Addressing the issue of imported timber, the member shed light on the complexities and stressed the importance of focusing on sustainable, locally sourced plantation species. Moreover, the dialogue delved into the potential of bamboo in construction, presenting it as a valuable resource with exceptional strength. The Panel noted the need for careful consideration of moisture levels in bamboo, coupled with the urgency to replace decaying trees and promote younger species, underscores the commitment to optimal forest health for carbon sequestration. The comprehensive approach outlined in the discussion aimed to regenerate nature, promote sustainable forestry, and address the impending threat to water scarcity, ultimately contributing to the broader goal of creating a healthier and more sustainable environment.

Bamboo Society of India offered to hold internal discussions within their society towards deliberating on the points for revision of the code (Chapter 3B).

3.4 The Panel noted the information about the Indian Standards formulated under the Timber and Timber Stores Sectional Committee, CED 09, Wood and other Lignocellulosic Products Sectional Committee, CED 20, Construction Practices

Sectional Committee, CED 13 as listed under the item of agenda. The panel decided to make full use of the published standards and those under development in these committees apart from the five ISO standards listed under item 4.2 of the Agenda, in the revision of the chapters by way of reference/concise reproduction.

Based on all the above, the following Subgroups were constituted by the Panel so as to take up the preparation of updates to the respective provisions in the two chapters of the Code:

Bamboo	**Email Id and Contact Number**	**Engineered Bamboo (incl Composites)**	**Timber**	**Engineered Timber (Timber Wood)**
Shri Vaibhav Kaley	vaibhav@wondergrass.in & 9011019001	Shri Anand Nandanwar, IWST	Forest Research Institute	Shri Anand Nandanwar, IWST
Ms Neelam Manjunath	neelamm62@gmail.com & 9945466204	Shri Narasimha Murthy, IWST	FOSET (Dr Parthasarthi Mukhopadhay)	Forest Research Institute
Bamboo Society of India	anandn@ipirti.gov.in & 9845464716	Forest Research Institute	Shri Anand Nandanwar, IWST	FOSET (Dr Parthasarthi Mukhopadhay)
CSIR-CBRI	sbhalla@civil.iitd.ac.in & 9810722691	IIT Delhi		NECTAR
Forest Research Institute	anilmutha3@gmail.com & 9820285700	Mutha Industries		Windsor Wood
Wonder Grass Initiative	krishna@nectar.org.in & 9899192757	NECTAR		

Item 4 COMMENTS RECEIVED ON / INPUTS RELATED TO PART 6 'STRUCTURAL DESIGN: SECTION 3A 'TIMBER' &SECTION 3B 'BAMBOO' OF SP7 : 2016

4.1 The Panel noted that no comments were received on the published code (2016 version) and also on the Two Working Drafts sent by BIS on 23 February 2024.

4.2 The Panel appreciated the efforts made by its members by way of writing technical/research papers and books relating to bamboo and timber for their use in construction that enables and supports to the cause of construction using not only sustainable building material but also used in earthquake prone regions.

4.3 The Panel noted the information 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 Panel also noted that these reforms relate to aspects 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

In this context, the members appreciated the efforts by BIS and the NBC team which shared useful information to access the standardization portal of BIS – Manak online which is available online. Members are encouraged to periodically access the portal in which not only the information about meetings namely the notice, Agenda, Attendance, Resolution, Minutes but also the Working Drafts, Preliminary Drafts, Wide Circulation Drafts are made available for access/commenting. Further information about the performances of various technical committees of BIS can also be witnessed using the Analytical Reports/Advanced Dashboard tab of the standardization portal.

4.4 The Panel appreciated the efforts of BIS that has established systems such as **action research projects**, R&D for standards development and provision for having **short-term Consultants**, all with a view to making the standards development a robust process acknowledging the latest developments on the subject happening world-wide including in technical events, literature, research publications, standard bodies, etc. The Panel agreed to consider and include wherever possible, generation of research based inputs by associating with the various eminent institutions with whom BIS has entered into MoU with; the list of such institutes are available in the BIS website, as at: CLICK HERE.

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

5.1 The BIS' Secretariat explained about the above Project that involved an exercise of Promotion of use of National Building Code of India 2016 in all States and UTs of India. The major deliverable namely the draft Standardized Development and Building Regulations aligned with the provisions of NBC 2016 and the other deliverables such as the State wise regulations, Pamphlets for awareness of general public, GUIDE TO USING THE NBC were explained to the members who appreciated the entire BIS team.

The Panel noted the information about the 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/

Item 6 DATE & PLACE OF THE NEXT MEETING

It was decided that the next meeting shall be held in consultation with the Convener after the receipt of inputs from the four Expert Groups who would present the draft provisions as new inclusions and changes/modifications to the existing text.

Item 7 ANY OTHER BUSINESS

There being no other business, the meeting ended with thanks to the Convener and all members.

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