

NBC 2016, Part 4 – Challenges to Acceptance & Implementation

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1.0 Introduction

The new edition of the National Building Code (NBC) is finally out, the document having been taken up for revision after a gap of more than a decade. Part 4 of the NBC which deals with Fire & Life Safety went through a great deal of effort from the main editorial team, and a long, drawn out process of review and revisions before finally seeing the light of day. An effort was made to engage maximum interested parties by circulating the draft of the code, inviting comments on the same, reviewing and incorporating relevant inputs from various stakeholders. Alterations and changes have been made to almost all sections of the code, which include new definitions and additions to fire prevention, life safety and fire protection sections. Additionally, occupancy specific requirements have been revised with addition of some new occupancies which were not included in the earlier version^[1]. The annexures also include new additions for requirements related to specific hazards/ occupancies and information on smoke management and venting systems. The addition of explanatory sketches and figures will help users understand the code recommendations better. The question to be asked, therefore, is whether the code will see wide acceptance and implementation.

1.1 Present Status

Past experience shows that only a handful of states have attempted to implement the previous versions of NBC Part 4 in toto, or its major parts. Most other states have implemented recommendations of the NBC Part 4 in their Development & Control Regulations and Rules in a 'pick and choose' manner. Based on the author's understanding, the reasons for this are primarily local factors, lack of clarity and understanding of the provisions and actual problems in implementation of measures (which also includes the problems of inadequate resources for implementation). The vast majority of stakeholders (developers, architects, engineers, regulators and occupants), especially in smaller cities and towns, remain unaware of the provisions of the code and its practical applications and implications.

As per a list^[2] brought out by a global insurance organization which specializes in loss prevention services, close to a 110 countries have their own building codes. Another document^[3] by the same organization compares the resilience of countries to various risks using some common parameters. One of the factors used in this ranking (i.e. the risk quality) also considers the prevailing building code in the country and its enforcement; in fact, it is the most influential determinant of risk quality for a country's commercial and industrial properties. India comes in at 54 on this scale (which is approximately half way), but could still be considered a positive achievement, considering that support for implementation from government/ municipal authorities and society in general, is weak. The document goes on to state that 'the key challenge for India will be to ensure

widespread enforcement of its updated code, which would improve its fire risk quality and natural hazard risk quality’.

1.2 Requirements for Acceptance & Implementation

It must be noted here that the NBC is a model building code, and needs to be formally accepted by states before it actually becomes a code, as Fire Safety is a state subject under our constitution. The ultimate success of the code therefore, depends upon states agreeing to accept and implement the code, ideally in toto. For this to happen, all stakeholders (regulators, developers, architects, engineers, facilities managers, occupants) need to be fully aware of, and be conversant with, the provisions of the code. The provisions and recommendations of the code need to be technically sound, consistent (with international as well as local practices), clear and unambiguous. At the same time, it is necessary that the code be in a form that can be easily implemented, but at the same time, be legally compliant. For any model code (including the NBC Part 4) to be acceptable and effective, therefore, certain basic but important requirements should necessarily be met. These include:

- Technically sound and proven recommendations
- Clear and unambiguous guidelines
- Language and form that has legal acceptance
- Increased familiarity and awareness of all stakeholders

In the following sections, aspects related to the above factors are examined to identify problems/shortcomings, and assess whether improvements are required and are possible. It must be noted that the intent is not to undermine in any way, the tremendous effort put in by members of the code committee. The author is aware, of the limited resources and time available to the main editorial team in the final stages of completion of Part 4 of the document. Rather, this is an attempt to ensure that required changes/ improvements, if required, can be brought about and this tremendous effort does not go waste but gets translated into full acceptance and implementation.

2.0 Technical Conformity and Verity

The NBC Part 4, like other model building fire & life safety codes, is based on past experience, research findings and data, as well as knowledge and expertise of the code writing committee members. Recommendations are based, to a large extent, on existing practices in internationally accepted building codes as well as local experiences of incidents, design practices, emergency and firefighting operations. Accepted international practices may be modified if local circumstances warrant such changes, provided the underlying concept and principles are not compromised.

A building code is as good as its contents. When outsiders, or practitioners who have used other building codes, work on projects within the country, they are bound to compare the quality of other codes with ours. While the quality of content is important, it is also important to ‘dot every i and cross every t’ to ensure correctness. Some examples related to these aspects in the

present version of NBC (which have come to the notice of the author) may be noted in this context:

- Many additions have been made to the 'Terminology' section; these could, however have also covered other important definitions related to sections which are present in the code for e.g. separated occupancies (one type of multiple occupancies – common in modern buildings), level of exit discharge (as this determines building height and creates confusion at some locations where two floors may exit outside), interior finish, flame spread index (as these are concepts applied in the code), mall, major tenant (since malls are important buildings in present context), hazard of contents (as this is the basis for using fire separation of hazardous areas), dead-end limit, vertical opening, etc. These definitions add clarity and relevance to the sections where they are used. Some important definitions such as fire load, exit, horizontal exits, etc, could have used standard technical terminology.
- As is evident from past accidents, it is the smoke and toxic gases from fires which are responsible for deaths in fire accidents. Recognizing this, all codes specify the smoke developed index along with the flame spread index as an important criteria for materials used as internal linings in buildings (and importantly, both are covered under the same test). In the same context, materials used for floor covering are required to have a critical radiant flux rating which ensures their suitability (or not) for use in buildings (especially critical for occupancies such as hotels which have carpets or floor linings). Specifying only the flame spread index is therefore, not a complete requirement for wall, ceiling and floor finish materials.
- The section on mixed occupancies requires applying the most stringent fire protection requirements out of the (mixed) occupancies involved. Secondly, it also requires the separation of these occupancies using 240 min fire rated barriers. As per standard practice, when the latter requirement (i.e. fire barriers) is applied between the occupancies, they no longer remain mixed, but are now 'separated' occupancies (another type of multiple occupancy), where occupancy specific requirements can be applied in each occupancy. It is only when occupancies are not separated using fire barriers that the occupancies become 'mixed' (and the higher fire hazard of one occupancy can affect the other) and the former requirement applies.
- The common path of travel is a constituent of the total travel distance, and all international codes specify this as part of the travel distance table (especially as it is an important factor which influences design and remoteness of exits). It is not clear why this value is selectively mentioned for only a couple of occupancies (and also the fact that the common path distance mentioned for these occupancies is same as the total travel distance).
- Since more than a decade, almost all building codes moved to the requirement of providing handrails on both sides of exit stairs, regardless of size. This was in recognition of the fact that in event of an emergency (and unordered) evacuation, evacuees are at risk of tripping if they do not have suitable gripping and support arrangement. A simple wall on the inside of the stairs does not meet this requirement, and hence handrails are required to be provided on both sides for support. This is, in fact, more applicable for stairs which are narrower, as the occupant density is higher and chances of tripping increase. For stairs which are 2.0 m or

wider, the provision of intermediate handrails (for people walking in the centre of the stairs) is recommended.

- The recommendation to allow use of balconies as refuge areas in high-rise residential buildings does not have any precedent in other international building codes. A refuge area is by definition a protected area (having fire rated construction) and therefore, it is not clear how balconies, which are connected to the rest of the house, offer similar level of protection? Refuge areas are also connected to the exit through protected (fire resistant rated construction) path, so that people can continue to evacuate after receiving such instructions. This may not be possible in case of balconies as fire growth will make conditions untenable on the floor in a short time (if the fire exists on that floor or a floor below), and accessing an exit from the balcony would become practically impossible.

3.0 Clarity & Unambiguity

To ensure clear interpretation and proper implementation, the recommendations of the code should be unambiguous and not create confusion of any sort. Ambiguity or the possibility of dual interpretation dilutes the quality and integrity of the code. Though rare, some examples of provisions in the code, which are not entirely clear or could lead to confusion are given below:

- Remoteness of exits is clearly specified in building codes by means of a specific remoteness criteria, such as distance between exits in comparison to diagonal of building, or the angle between exits. Not specifying the remoteness criteria leaves the door open for speculation and arbitrary interpretation.
- By its inherent property, an exit is separated from all other spaces of a building or structure by (fire rated) construction to provide a protected way of travel to the exit discharge. The present code allows non-rated opening protectives (doors) for exit stairs in certain occupancies, which contradicts this very definition. Option allowing one exit stair to have non fire-rated door while the other requires a fire-rated door creates confusion regarding the application of such provisions.

Allowing this provision in residential occupancies (and other provisions such as use of balconies as refuge areas), gives the impression that the residential is considered less hazardous considering the familiarity of occupants with layout of the building. It must be noted however, that worldwide, the maximum number of fires and maximum number of fatalities are recorded in the residential occupancy, reason enough to not have any laxity in this occupancy. At the same time, 'sleeping risk' and the fact that fire loads are least unregulated in this occupancy increases its fire risk.

- The code does not allow 'battery pack' emergency lighting (which refers to 'self-contained' emergency lighting units) in lieu of diesel engine standby power. This could however, be interpreted that only diesel engine standby power is acceptable, whereas it is a normal practice to have emergency supply from a trickle-charged central battery bank (or UPS), and same is permitted in another clause of the code.
- The recommendation to have a fire tender draw out connection for connecting fire tender pumps directly to the tank and draw water through a fixed suction pipe is unique in nature,

but needs to be further studied for practical implementation. The present recommendation to have male inlets may not be effective as soft hoses will not work with negative suction. Also a foot valve which is not inspected and tested regularly is unlikely to work in the event of emergency. And then, there's the issue of bringing fire tenders too close to a building on fire.

- The provisions in the code which are not in line with internationally prevalent norms but which are unique to the code should have adequate technical justification (in form of past data, research or successful field tests) before application. This includes provisions such as using water curtains in lieu of fire rated walls in basement car parks. This recommendation raises several relevant questions – what is the type of water spray pattern which will achieve this objective (i.e. equivalent fire resistance of 2 hours)? How will the discharged water (a much, much higher quantity as compared to sprinkler discharge, and the fact that it will be operated for 60 minutes) be handled, as it will require provision of suitable drains, sumps and pumping arrangement to remove this water? How will the water curtain system interact with a smoke control system (which is required for basements)? Is a large quantity of water discharge appropriate for an area where a fuel leakage from parked vehicles is possible?

In the case of water curtains being used in lieu of fire rated walls for compartmentation (as seen in earlier section), the specified rating for compartment walls is 2 hours, whereas the water curtain operation is acceptable for 1 hour. The two are therefore, not equivalent in terms of performance, and give rise to doubt regarding its application and effectiveness.

4.0 Legal Standing

The NBC Part 4 is a model building code (and not a guide document), and written with the intent that it can be straightaway formalized into local building laws and rules. However, it can attain legal status only when formally accepted by a state for implementation. To ensure that this can be done easily, the code needs to be written in a form that will have legal propriety. This not only requires technically correct language, definitions and referencing, but also the use of language which meets legal requirements.

- Use of words such as 'shall', 'should', 'will', etc, have to be clearly defined and carefully applied in the context of the various recommendations.
- Use of words/expressions such as 'may', 'may not', 'is desirable' should be carefully applied as these tend to introduce confusion and ambiguous interpretation.
- Sentences/provisions which are unclear or ambiguous to be avoided or reworded to provide clarity.
- Most standard building codes use annexures as explanatory/ supporting information and references to main chapters, where recommendations/ provisions are given. Present structure of the code gives recommendations in both the main chapters as well as the annexures (it may be noted that recommendations given in the main section can be considered mandatory, but not necessarily those in the annexures). If required, future revisions of code can be re-structured to be easier to reference, from a legal standpoint.

5.0 Familiarizing Stakeholders with Code Provisions

This is probably the most important (and neglected) factor for acceptance and implementation of the code. The purpose of a code is served only upon its acceptance by stakeholders. For this, all relevant stakeholders need to be educated about the code provisions and its implications. While most stakeholders are represented on the committee, the fact is that once the code is formalized, there is no effort to reach out to and familiarize these different stakeholder communities (builders/ developers, engineering houses, consultants, enforcing authorities, etc) with the code. It is also very important to introduce the code concepts to the large community of students who will be involved in building design, engineering, construction and operation in the future.

5.1 Education or Persuasion?

Safety of society (including fire safety) is the responsibility of the government, and if it considers this important, it should adopt all legal and administrative options to achieve this objective. At the same time, if society's awareness and perception about this issue is influenced in a positive way, fire safety can be achieved in a much more effective manner. In reality, both options i.e. training and legislation have to be implemented in a complementary manner.

One regularly hears about training workshops/ seminars on international building codes conducted by code committee members/ experts on those codes. It is rare to see such workshops being conducted within the country (except for a few short seminars being conducted by Industry organizations). Unless the code provisions and the underlying concepts and principles are explained to stakeholders, they will be unable to appreciate its importance in creating a fire-safe society. While this is a huge task, it is not unachievable. The primary responsibility lies with members of the code writing committee and experts to disseminate code provisions and information to relevant stakeholders, who in turn can pass it on to their respective communities. There needs to be some commitment from code committee members to engage in training workshops/programmes to disseminate information and familiarize participants with code provisions and changes.

An effort is required to be made to prepare explanatory notes and 'handbooks' on the provisions of the code so that the knowledge of code provisions can be passed onto the large community of students and budding professionals (as well as present professionals!)

From past experience, it is evident that the code provisions get diluted to a great extent by the time they get adopted into local Building control rules and regulations. Even when in the form of legislation, there is tremendous inertia from the different stakeholders to implement these regulations. While supporting laws are becoming more stringent (RERA being an example, which puts the onus of the building safety on multiple partners, the builder being one of them^[41]), the responsibility of effective implementation is still on the state. Unless government and influential communities (developers, architects, regulatory authorities) do not principally understand and accept the importance of the implementation of the code, it will never achieve its objectives. Rather than just having a passive and

advisory role, more interaction and coercion from appropriate central ministries, bodies and departments in this area should be welcome.

6.0 The Way Forward

While the revision of the NBC Part 4 is no doubt, a tremendous effort and accomplishment by itself, there still remain major challenges that need to be overcome to ensure the code's acceptance and relevance. To this end, some possible future steps could include:

- In view of the dynamic and changing real estate sector, reduce the revision cycle suitably. Make the review/ revision an ongoing process rather than a periodic 10 year ritual.
- Ensure technical and legal correctness of code provisions. If acceptable, identify and remove/ modify excessively restrictive provisions. The possibility of issuing amendments for this (or other alternatives), needs to be explored
- Include more and diverse stakeholders in future committees; especially building research professionals/ academia, and legal community members, so that new findings, research are incorporated and legal compliance is assured. Use technology to expand reach and coverage, and encourage communication.
- Encourage training and education related to code provisions. Commitment from code committee members to involve in training. Bring out explanatory material and handbooks.

As stated earlier, the role and importance of a building code in ensuring and improving fire safety in the society and country cannot be overstated. Fire community leaders have expended considerable time and effort to review and revise Part 4 of the NBC. Problems/ shortcomings that are identified need to be addressed so that the code becomes useful and practicable. It is now the responsibility of the entire fire fraternity to ensure maximum acceptance and implementation so that the document achieves its objectives and contributes to the nation's fire safety.

References:

- [1] National Building Code and the Subsequent Revisions, Dheri D.K., FSAI Journal, March-April 2017
- [2] Country Building Codes Index, FM Global, May 2016
- [3] 2017 Resilience Index Annual Report, FM Global, 2017
- [4] National Building Code: Will it work in Indian real estate? Ravi Sinha, <https://housing.com/news/national-building-code-will-work-indian-real-estate/> accessed 29-05-17
- [5] NBC 2016, Part 4 – Fire & Life Safety, BIS, 2017