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निर्माण सारिका

A Newsletter of BMTPC

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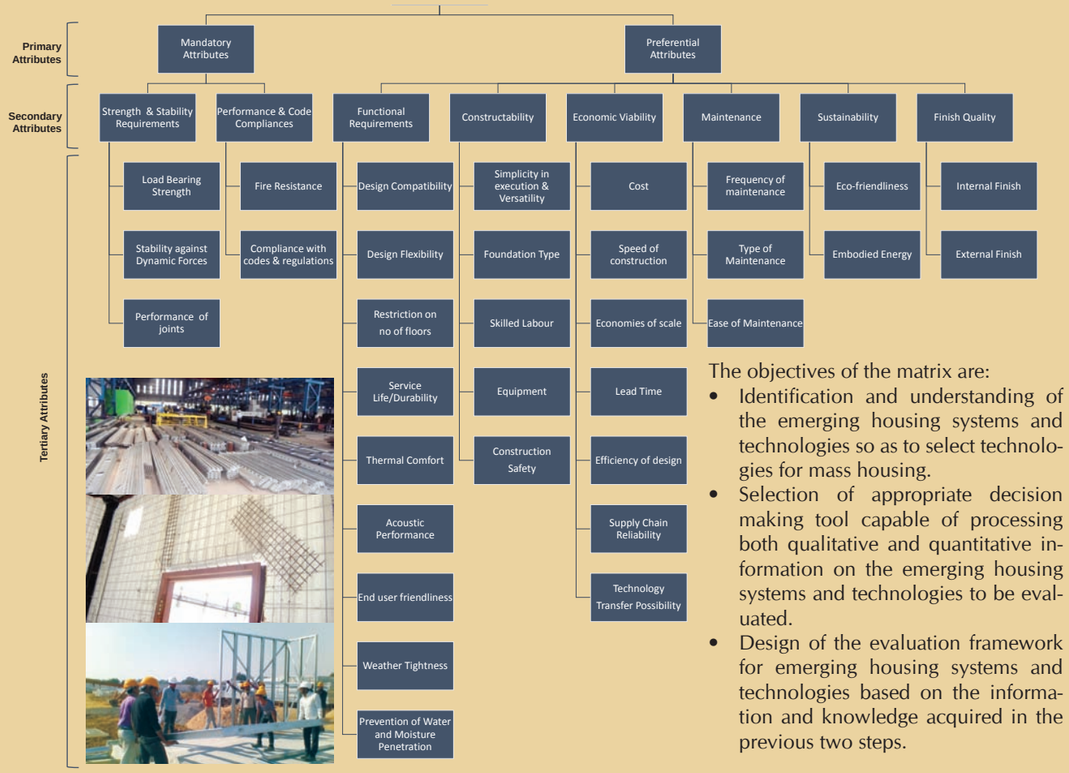
BUILDING MATERIALS & TECHNOLOGY PROMOTION COUNCIL

Ministry of Housing & Urban Poverty Alleviation, Government of India

भाग 3, अंक 2, अप्रैल – जून 2014, नई दिल्ली Vol. 3, Issue 2, April - June 2014, New Delhi

Development of Multi - attribute Evaluation Methodology for Emerging Housing Technologies

BMTPC is evolving a matrix of multi–attributes criterion for evaluation of emerging housing technologies in association with RICS School of Built Environment, Amity University.



The objectives of the matrix are:

- Identification and understanding of the emerging housing systems and technologies so as to select technologies for mass housing.
- Selection of appropriate decision making tool capable of processing both qualitative and quantitative information on the emerging housing systems and technologies to be evaluated.
- Design of the evaluation framework for emerging housing systems and technologies based on the information and knowledge acquired in the previous two steps.

Performance Appraisal Certification Scheme (PACS)

Surveillance inspection of the work relating to Performance Appraisal Certificate (PAC) No 1009-S/2012 for Glass Fibre Reinforced Gypwall Panel issued to M/s FACT-RCF Building Products Ltd., Kochi was carried out on May 29-30, 2014. The detailed inspection with regard to production of the product, machineries, equipment, manpower required, Testing Facilities, etc. was conducted. Samples of the product were drawn and sent to IIT, Madras for carrying out relevant tests as per the relevant Standards/ methods. During inspection, it was observed that Quality Assurance System and production procedures of the PAC holder are in the conformity of industrial in-house capability. Manufacturing facilities and process control were found to be satisfactory.

For further details, please contact:

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From the Desk of the Executive Director

In its quest to bring new emerging technologies for mass housing with the overall objective of sustainable & affordable development, BMTPC is making definitive strides to identify, evaluate, certify & mainstream global construction systems into Indian construction sector. BMTPC has been organizing various kinds of handholding programmes to sensitize state authorities, urban & local bodies about the merits of these systems and what is the way forward to adapt them in states. We are being heard and it is commendable that Delhi, Maharashtra, Gujarat, Kerala & Karnataka have already started using new technologies for construction. Nevertheless, the real success would be when instead of isolated projects, the alternative construction systems become as popular as conventional systems. We need to work on all front but the first & foremost is building capacities within India for execution of projects using new technologies. Be it architect, structural engineer, planner or contractor & artisans, all need to be trained. Also, we need to be innovative in our approach while taking up construction projects and think of new ways of construction specially prefabrication which will help in completing the project faster and at the same time what we get is long lasting quality product.

Let us all adopt innovative ways towards sustainable development

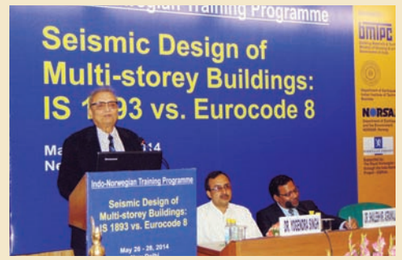
(Dr. Shailesh Kr. Agrawal)

Published by:

Building Materials & Technology Promotion Council, New Delhi

Indo-Norwegian Training Programme on Seismic Design of Multi-Storey Buildings: IS 1893 vs. Eurocode 8

In order to build capacities as regards earthquake resistant design and construction specially amongst professional civil engineers, BMTPC joined hands with Indian Institute of Technology, Roorkee (IIT Roorkee) and NORSAR, Norway to organize one of its kind programmes on structural analysis and design of building using Indian Standards with the broad exposure to clauses of Euro Code 8, a widely used code for design of multi-storeyed buildings, from May 26 to 28, 2014 at New Delhi. IIT Roorkee is one of the premier organization having excelled in the area of earthquake resistant design and construction and NORSAR, Norway is an independent research foundation specialized in seismological research and engineering services. The Training Programme was supported by the Norwegian Embassy to India, New Delhi through the Indo-Norwegian Collaboration Project EQRisk.



The Training Programme was inaugurated by "Padma Shri" Shri B. Bhattacharjee, Hon'ble Member, National Disaster Management Authority and Former Director, Bhabha Atomic Research Centre and Member, Atomic Energy Commission. During the Inaugural Session the participants were addressed by Dr. Shailesh Kr. Agrawal, Executive Director, BMTPC, Dr. Dominik H. Lang, Senior Research Engineer, NORSAR, Norway, H.E. Mr. Eivind S. Homme, Ambassador, Royal Norwegian Embassy, New Delhi, Dr. Yogendra Singh, Professor, Department of Earthquake Engineering, IIT Roorkee. The programme was attended by around 100 participants from various parts of the country as well as from Nepal. Although initially it was planned to accommodate 45 participants but due to overwhelming response to this Course, the number of seats had to be increased twice. The course was specifically targeted to Structural & Geotechnical Engineers and Designers in public and private sectors with emphasis on real-life problems and tackling them through hands-on training.

Emerging Technologies for Building Construction

Light Gauge Steel Frame (LGSF) System

Light Gauge Steel Frame (LGSF) system is an upcoming alternative technology replacing conventional construction for building construction. LGSF system is similar to wood framed construction in principle – replacing the wooden framing members with thin galvanized steel sections.

It is based on factory made galvanized light gauge steel components, designed as per codal requirements. The steel sections used here are called cold formed sections, meaning that the sections are formed, or given shape at room temperature. This is in contrast to thicker rolled section, that are shaped while the steel is molten hot. Cold form steel is shaped by guiding these sheets of steel through a series of roller, each roller changing the shape very slightly, with the net result of converting a flat sheet of steel with high tensile stress into C or S shaped section.

The steel used here is galvanized (coated with zinc) or zincalume/galvolume (coated with mixture of zinc and aluminium). The thickness of coating is varied to suit a range of environment.

An economical light gauge steel frame system is increasingly being used in America, Europe, Australia and New Zealand and is gaining ground in India. LGSF is typically ideal for one to four storey high buildings, specially in residential houses, apartments and commercial buildings. LGSF can be combined with composite steel/concrete deck resting or light steel framing stud walls.

In a steel framed house, the loading path of the house structure is used to determine the design requirement based on which, sections are designed and manufactured using Centrally Numerical Control (CNC) automatic machines.

A steel framed house would normally be built on a reinforced concrete ground floor slab. The ground floor wall panels would then be fastened and held down to the ground floor slab. The second storey floor bearers would then sit on the top of load bearing walls. These bearers would connects and carry the floor joists. The floor joists would in turn carry the floor boards and the wall panels above. The roof trusses would then sit on the wall panels to carry the roof system and roof loads.

Connections for steel framing can consist of self-drilling screws, bolts and anchors. Welding is usually not required and mechanical fasteners would suffice in most cases.

Wall cladding is designed to resist wind load and shall have adequate fire resistant property and can be made

using cement particle boards, polystyrene case panels , CLC blocks, etc.

Advantages:

- ***Buildability:*** The use of pre-fabricated and pre-assembled steel components reduces site works, reduces material waste and improves quality.
- ***Speed:*** This system requires a shorter construction period compared to that for a conventional system.
- ***Strong but lightweight:*** Steel has one of the highest strength-to-weight ratios of any construction material. This results in savings in the foundation required and the lightness also makes for easier on-site handling.
- ***Safety:*** Structures can be designed to meet the highest seismic and wind load specifications in any part of the country as per Codal provisions.
- ***Quality:*** A better quality finished house that is durable and low in maintenance.
- ***Easy to remodel:*** Remodeling can be easily accomplished. Non-load bearing walls can be readily relocated, removed or altered.
- ***Design flexibility:*** Because of its strength, steel can span longer lengths, offering larger open spaces and increased design flexibility without requiring intermediate columns or load bearing walls.
- ***Recyclable:*** All steel products are recyclable.

Limitations:

- LGSF allows the passage of sound more readily than solid masonry construction.
- LGSF will lose strength in the advent of fire. Adequate fire protection must be used. Easiest form of fire protection is to clad the steel with fire rated sheeting or drywall.

The technology has been evaluated for M/s JB FabiInfra Pvt. Ltd., Raigarh and certified by BMTPC through PAC No. 1014-S/2014.

Alternate Building Materials & Technologies

Precast RC Planks and Joists for Floors & Roofs

Precast Reinforced Cement Concrete (RC) planks are partially precast rectangular slab elements. These are supported over partially precast RC joists side by side and then joined together and also to the joint by pouring in-situ concrete over the hunch provided in the planks and the gaps between the planks over the joints. Monolithic action of the slab elements is ensured by leaving hooks projecting out of joists and providing reinforcement across the joists over hunched portion of planks, tying them together and pouring in-situ concrete over them.

The RC planks are designed as simply supported for self weight including in-situ concrete over hunched and as continuous slab for a load comprising live load, self weight and dead load of floor finish and / or water proofing treatment. The precast plank for floor as well as roof of normal residential buildings has 3 nos. 6 mm dia. MS bars as main reinforcement and the transverse reinforcement comprises of 6 mm dia MS bars spaced at 200 mm on centres. For continuity, in RC planks, at the support, 2 nos. 6 mm dia MS bars per plank along the length and 2 nos. 6 mm dia MS bars as transverse reinforcement over each support are provided in the haunch portion.

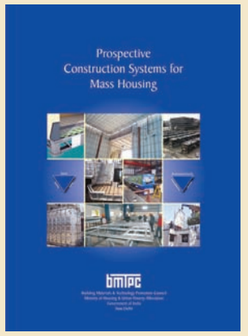
It is designed as simply supported for continuous T-beam with 60 mm flange thickness depending upon whether the joists are having single span or continuous over adjacent span. The reinforcement is provided as per design requirements depending upon the spacing and span of the joist determined in accordance with IS 456.

For large spans requiring high moment of resistance, either the depth cannot be increased due to head room requirements, the joist is designed as double reinforced beam at the support.

Minimum clear cover of 15 mm for planks and 25 mm for joists shall be provided.

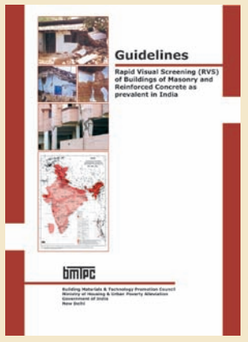
Recent Publications

PROSPECTIVE CONSTRUCTION SYSTEMS FOR MASS HOUSING – TECHNOLOGY PROFILES



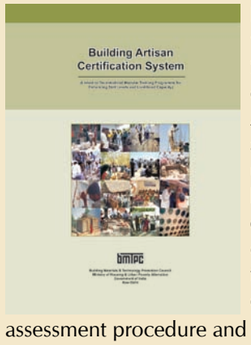
In an attempt to bring new construction systems for mass housing, BMTPC identified and evaluated a few systems which can help in providing safe, strong and quality housing in quick time. The booklets in the docket contains technical details of potential technologies/ systems such as Monolithic Concrete Construction System; Expanded Polystyrene Core Panel System; Industrialized 3-S System; Speed Floor System; Glass Fibre Reinforced Gypsum Panel Building System; Factory Made Fast Track Modular Building System; Light Gauge Steel Framed Structures.

GUIDELINES ON "RAPID VISUAL SCREENING OF BUILDINGS OF MASONRY AND REINFORCED CONCRETE AS PREVALENT IN INDIA"



For earthquake mitigation, it is not only necessary to build earthquake safe structures but also ensure safety of existing buildings. For this, assessment of existing buildings is necessary. The Rapid Visual Screening (RVS) is used for this purpose, so as to prioritize the buildings for more complex and expensive evaluation. This document provides the detailed procedure of Rapid Visual Screening.

BUILDING ARTISAN CERTIFICATION SYSTEM



BMTPC has brought out "Building Artisan Certification System" under an initiative entitled 'Evolving Building Artisan Certification Program at National Level' for skill upgradation of the existing building artisans. This document contains the details of the Certification System for 8 trades, their hierarchy, eligibility requirements, assessment procedure and required training.