Standards/Guidelines Referred:

IS 456:2000	-	Code of Practice for plain and reinforced concrete.
IS 875 (Pt.3):1987	-	Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures - Part 3 : Wind Loads
IS 1786:2008	-	High strength deformed steel bars and wires for concrete reinforcement-
IS 1893 (Pt.1):2002	-	Criteria for Earthquake Resistant Design of Structures - Part 1 : General Provisions and Buildings
IS 1950:1962	-	Code of practice for sound insulation of non-industrial buildings
IS 2185 (Pt.3):1984	-	Specification for Concrete Masonry Unit - Part 3: Autoclaved Cellular (Aerated) Concrete Blocks
IS 3792:1978	-	Guide for heat insulation of non-industrial buildings
IS 6073:2006	-	Autoclave Reinforced Cellular Concrete Floor and Roof Slabs - Specification
IS 13920:1993	-	Ductile detailing of reinforced concrete structures subjected to seismic forces - Code of practice
NBC 2005	-	National Building Code, 2005

About BMTPC

Set up in 1990, Building Materials & Technology Promotion Council (BMTPC) an autonomous organisation under the Ministry of Housing & Urban Poverty Alleviation strives to bridge the gap between laboratory research and field level application in the area of building materials & construction technologies.

Vision
"BMTPC to be world class knowledge and demonstration hub for providing solutions to all with special focus on common man in the area of sustainable building materials, appropriate construction technologies & systems including disaster resistant construction."

Mission
"To work towards a comprehensive and integrated approach for promotion and transfer of potential, cost-effective, environment-friendly, disaster resistant building materials and technologies including locally available materials from lab to land for sustainable development of housing."

For more information, kindly contact:

The Executive Director
BUILDING MATERIALS & TECHNOLOGY PROMOTION COUNCIL
Ministry of Housing & Urban Poverty Alleviation, Government of India
Core 5 A, 1st Floor, India Habitat Centre, Lodhi Road, New Delhi – 110003
Phone: +91-11- 24638096, 24636705; Fax: +91-11-24642849
E-mail: bmtpc@del2.vsnl.net.in, Website: www.bmtpc.org

Prospective Construction Systems for Mass Housing

No. 4/2014

TECHNOLOGY PROFILE

Industrialized 3-S System using Cellular Light Weight Concrete Slabs & Precast Columns

Building Materials & Technology Promotion Council
Ministry of Housing & Urban Poverty Alleviation
Government of India
New Delhi

System in Brief

The industrialized total prefab construction technology is based on factory mass manufactured structural prefab components conforming to provisions of relevant Indian Standards. The major precast elements are:

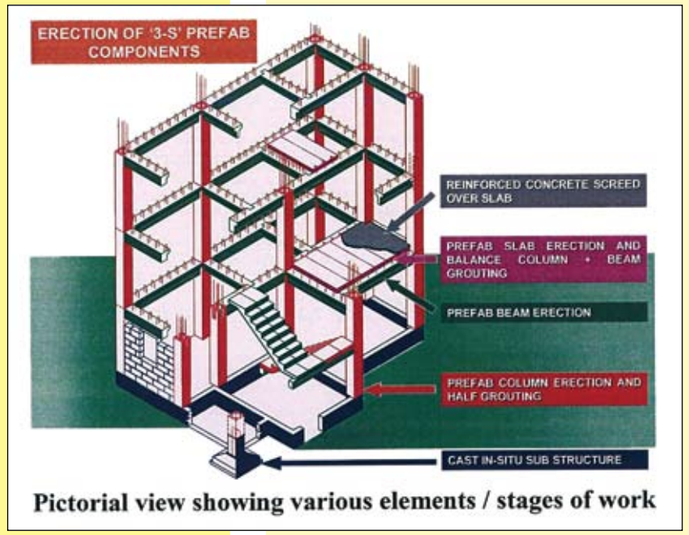
- RCC hollow columns with notches
- RCC solid beams (T/L/Square Shape)
- Staircase
- RCC precast slab
- AAC precast slab
- AAC precast block

In the system, precast dense concrete hollow column shell of appropriate sizes are used in combination with precast dense concrete rectangular / 'T' shape / 'L' Shape beams with light weight reinforced autoclaved cellular concrete slabs for floors and roofs. The hollow columns are grouted with appropriate grade of in situ concrete. All the components and jointing of various structures are accomplished through on-site concerting along with secured embedded reinforcement of appropriate size, length and configuration to ensure monolithic continuous resilient, ductile and durable behaviour. Autoclaved Aerated Concrete (AAC) slabs can be used as floor / roof slabs. Joints are filled with 1:5 Cement Mortar and separate screed concrete of minimum 40 mm thick, grade M20 is put in the entire area of slab before flooring / water proofing.

	RCC hollow columns & Beam		AAC Precast Slab	AAC Precast Block
	Concrete	Reinforcement		
Basic Material Requirements	Shall conform to appropriate grade based on environmental condition as per IS 456 : 2000	Shall be of Fe 415 Grade or Fe 500 Grade as per IS 1786:2008	Grade 1 of Density 551 – 650 Kg/m^3 of IS 6073:2006	Density 451-550 Kg/m^3 for internal wall, 551-650 Kg/m^3 for external wall as per IS 2185 (Pt. 3) :1984
Other Requirements: Evaluation of Structural Requirement of Joints	***against vertical load*** • Full Scale load test on assembly of RC precast assembly by Tor Steel Research Foundation in India, Bangalore found it safe. • Structural Design evaluation for HIG – II Buildings at Powai by Shri H.P. Shah; Stanford University found that based on the design concept, design calculation and detailing; the structure is safe against vertical loads, seismic loads and the wind loads. • Scrutiny of design for G+15 HIG type tenements by IIT Mumbai found it safe.			
	against seismic and wind load Test performed on full scale building to establish behaviour of various joints under all design loads including seismic Zone IV by CBRI. The experimental results on Full Scale Building Structure established the desired performance and behaviour of the system under all loading condition as above. When designed for use in Zone V, independent verification may be needed.			
Durability	• Anti corrosive treatment given to reinforcement used in AAC panels for durability, was evaluated by CBRI, Roorkee with satisfactory results. • Concrete and cover requirement are as per durability clause of IS 456 : 2000, to ensure adequate durability.			
Fire Resistance property of block / slab as dwelling unit	AAC blocks / Slabs used will have fire rating as per the NBC norms for dwelling units.			
Thermal Behaviour	Kvalue – 0.122 k cal/h/m^{o}c of AAC blocks*.			
Acoustic Comfort Test	For 100 mm ACC Wall, Sound absorption is 38 – 40 db*			
Impact Resistance	Not tested*			
Ease of Fixing services (Electricity & Plumbing)	With pre-planning, electricity & plumbing services can easily be placed.			
Availability of Plants & Machinery	Plants & Machineries for production of Components available in Pune and Delhi			

Scale of economy	• For a new plant to be setup, a minimum project of 5000 dwelling units may be needed. • In places, where plant is already set up, smaller project may also be viable.
Essential Requirements	• Precasting yard / factory set up is required with facilities such as Casting Yard, Computerised batching plant, Moulds, Transportation facility, Stacking yard for materials & components, Lifting and loading facility, Laboratory to test raw material & finished products, Water tank of enough holding capacity as required for 2 – 3 days, Service road, etc. • Utmost attention is required for process engineering before taking up any field work. Close co-ordination between design crew, field staff and quality crew is essential.
Limitation	The project is taken as turnkey project by the agency M/s B.G.Shike & Co., Pune. No other agency is involved in this propriety system.
Major Construction work done	• Residential LIG and MIG housing project at Matulya Mills Ltd., Lower Parel, Mumbai • Residential mass housing project of MSCADA, Powai, Mumbai • Multistoried Residential Building at Chennai for True Value Homes Pvt. Ltd. • Mass Housing Project at Delhi for DDA. • S+30 multi storeyed building for National Peroxide Ltd, Wadala • Several projects are being taken up / completed in Maharashtra & Delhi.

* *Implementing agency may verify it, if deem necessary.*



Pictorial view showing various elements / stages of work