

EPS Core Panel Construction

Expanded Polystyrene Panel QUIKBUILD CONSTRUCTION SYSTEM



Today's construction industry is facing severe challenges in various aspect. These challenges are:

- 1. Need for Green rated / energy efficient buildings.
- 2. Fast track construction.
- 3. Efficient Utilization of constructible area.
- 4. Shortage of labour / construction materials.
- 5. Sustainability and Durability.
- 6. Need for stronger and light weight construction materials.
- 7. Technology need for todays Architectural designs.

QUIKBUILD – A SOLUTION TO THE ABOVE NEEDS.

What is it QUIKBUILD?



- Expanded Polystyrene Core Panel supported by High Tensile Galvanized steel frame acts as a mesh and holds the concrete with it
- EPS Panel thus makes a solid load bearing wall and roof
- German technology, widely used in Europe and Australia
- IIT Chennai certified for G+2





QUIKBUILD

QuikBuild Construction System

QUIKBUILD – Modular Panels

Product Introduction

The QuikBuild Construction System uses modular panels and accessories to build a frame for a structure. Concrete or Plaster is applied to these panels to finish the structure.

The panels consist of

- (1) Polystyrene Core
- (2) Galvanised Wire Mesh two outer layers

(3) Galvanised Wire Trusses pierced through the Polystyrene Core and welded to each of the outer layer sheets of Wire Mesh.





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Product Specification

QuikBuild panels are available in the following sizes:

Width Length EPS Slab Thickness EPS Slab Type Mesh Spacing Mesh Wire Thickness (dia) – 1200 mm

– 2000 ~ 6000 mm

- 50, 80, 100, 120, 150 mm
- Plain or Corrugated
- 50 x 50 mm , 100 x 100 mm
- 2.5 mm , 2.0 mm, 3.0 mm



ROOF PANELS



- Groove (Approx. 2" deep) for Micro Beam (With or Without Steel Rod).
- Minimum thickness of core in panel is 80mm. Tongue and groove joint also available at end.
- 3" Concrete bed on our Roof Panel with Minimum reinforcement at 600mmX600mm CC.



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Construction System

Technical Details

QuikBuild panels are tested and certified by IIT-Chennai (Structural Engineering Lab) and BMTPC

<u>Wall Panel</u>

 $(2.5 \text{mm Wire}, 50 \times 50 \text{mm Mesh}, 50 \text{mm EPS Panel} + 1'' plaster both sides)$

Self Load 120 kg/m2

Plaster Ratio

- Load Bearing 350 kN/m
 - 1st Coat 15mm of 1:2:3 (Chips mix 100% of size < 6mm)</p> 2nd Coat 10mm of 1:5 (Cement/Sand only)

<u>Roof Panel</u>

(2.5mm Wire, 50x50mm Mesh, 80mm EPS Panel + 1" plaster + 3" concrete) Self Load 280 kg/m2 Load Bearing – 10 kN/m2 Concrete Ratio - 1:2:4 (Chips mix - 50% of size < 18mm + 50% of size < 10mm)

Please note that other combinations of wire mesh and wire size will have different values.

ACCESSORIES





I-Mesh Flat Joining Mesh





C-Mesh Panel End Covering Mesh

L-Mesh Corner Joining Mesh

EPS Advantages

QuikBuild Construction System

- 50% Faster (than conventional construction)
- Stronger & Lighter
- 6 to 8 degrees cooler
- Good Sound Insulation
- Green Building
- Earthquake Resistant & Crack Proof because of Monolithic Structural Pattern
- Fire Proof
- 10% More space because of thinner walls
- Onsite Construction No need of heavy Panels being transported or heavy machinery
- Certified Bullet Proof
- Design Flexibility

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QUIKBUILD



Light weight

•30 % weight of 230 mm Brick-Work

- Quikbuild Wall = 120 ~ 250 Kg/ m2 Depending on plaster thickness.
- •Brick-Work =500 Kg/ m2
- •Reduced costs for foundation, beams, columns etc.



Quikbuild



Safe Connections of Non-structural Elements

• No danger due to non-structural elements (such as collapsing brick walls)





continuous mesh reinforcement no connection brick-column or beam

Quikbuild



Box-like Structures

• The box-like structure guarantees maximum resistance against earthquake forces .



Earthquake Resistance

Model of a 6-storey building Tongji-University, Shanghai



- Iink folder\V16e Earthquake Test, Model 1 to 6.pdf
- Iink folder\MPEG Earthquake
 Kazakhstan,1_21.mpg



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Quikbuild



QUIKBUILD 3D EPS PANEL CONSTRUCTION – STRENGTH (DISASTER RESISTANT MATERIAL)



Quikbuild



QUIKBUILD 3D EPS PANEL CONSTRUCTION – STRENGTH (DISASTER RESISTANT MATERIAL)





Construction Procedure

Foundation











Quikbuild Panel Installation







QuikBuild Construction System



Electrical & Plumbing





Shotcreting





Shotcreting





Roof Supports & Concreting





Roof Supports & Concreting



Roof Concreting





Roof Concreting

























Residence - Mysore





Hospital - Satyavedu





Residence - Bhimavaram





Farmhouse - Moinabad





LUXURY FARM HOUSE – HYDERABAD











CERTIFICATIONS

IIT TEST CERTIFICATES





STRUCTURAL ENGINEERING LABORATORY DEPARTMENT OF CIVIL ENGINEERING INDIAN INSTITUTE OF TECHNOLOGY MADRAS CHENNAI - 600 036. Email : garao@iitm.ac.in

To, M/s. BEARDSELL LIMITED, 47, Greams Road, Chennai – 600006 Date: 10-12-2013.

Sub: Quikbuild Wall and Roof Panel Testing-Reg.

This report deals with the preliminary observations made at the Structural Engineering Lab, IIT Madras, Chennai on Quikbuild panels supplied by M/s. Beardsell Ltd and recommendations for use as structural components.

I. Axial Compression Tests

Table 1 shows the test results obtained on various Quikbuild panels as wall elements that were produced for load bearing and non-load bearing applications. The details of the tested panels are shown in Annex-A.

Table 1: Dimensions, ultimate load and modes of failure of Quickbuild panels as wall elements.

S. No.	Designation	Dimensions (L X TH X H), mm	Ultimate Load, kN/m	Failure Load, kN/m	Remarks
1.	BL/IIT/WL001A	1230 X 100 X 1530	76.94	50.2	Vertical faces Unconfined
2.	BL/IIT/WL001B	1230 X 150 X 1530	85.93	56.1	Vertical faces Unconfined
3.	BL/IIT/WL002	720 X 110 X 1250	125.5	156.9	Vertical faces Confined
4.	BL/IIT/WL003	690 X 110 X 625	264.7	352.9	Vertical faces Confined
5.	BL/IIT/WL004	530 X 115 X 731	186.32	351.5	Vertical faces Confined
6.	BL/IIT/WL005	1043 X 100 X 1248	352.7	367.87	Vertical faces Confined
7.	BL/IIT/WL006	1066 X 140 X 1250	447.33	559.17	Vertical faces Confined

members.

Conclusion and Recommendations

 The quickbuild panels tested showed high load carrying capacity. The quickbuild panels confined on the vertical faces showed improved load carrying capacity and high stiffness and significantly reduced cracking. The testing and mode of failure of quickbuild panels under direct compression is shown in Annex-C.

The following conclusions can be drawn from the testing of quickbuild panels as compression

 The load carrying capacity of the quickbuild panels has been observed to be significantly high, which can easily withstand the critical loads estimated for typical G + 2 Floor housing systems calculated corresponding to critical load combinations of loads as per IS 875.

In view of its high load carrying capacity, light weight along with thermal comfort and acoustic proof, the sandwich quickbuild panels are recommended for use as external and internal walls in the existing RCC G + 2 structures as well as in the high rise multistoried buildings.

II. Static Flexural Test (for Slab element)

The quickbuild panels supplied by M/s. Beardsell were tested tested as roof elements at the structural engineering laboratory, IIT Madras, Chennai. The test results are shown in Table 2. These panels were tested in order to estimate the carrying capacity of the panels as roof or slab elements in the structural applications. Annex-B shows the details of the quickbuild panels tested.

Table 2: Dimensions, ultimate load and modes of failure of Quickbuild panels as roof elements.

S. No	Designation	Dimensions (B x L x t)	Effective Span, 1, mm	Reinforcement Details	Type of Loading	Applied Load, kN	Self-Weight, kN/m ²	Ultimate Load(w), kN/m ²	Service Live Load, kN/m ²	Remarks
1	BL/IIT/RF-001	1220 X 1055 X 85	1020	No Main Reinforcement	Three- point loading	17	2.8	15.8	10.5	Used for sunshade, Non load bearing roof like sloping roofs
2	BL/IIT/RF-002	1230 X 1050 X 130	850	2-10mm diameter bars along span	Three- point loading	11	2.76	10.5	7.0	Used for sunshade, Non load bearing roof like sloping roofs
3	BL/IIT/RF-003	1230 X 1460 X 170	1260	No Main Reinforcement	Four- point loading	21.5	3.27	18.4	12.5	Used as roof for spans within 6ft.
4	BL/IIT/RF-004	1240 X 1460 X 160	1260	2-10mm diameter bars along span	Four- point loading	60	4.38	38.4	25.6	Used as load bearing flat roof for spans within 13ft.

Dr. G. APPA-RAO Structural Engineerint Ovision Department of Civil Engineering Indian Institute of Technology Madras Chennal - 600 036, India

Dr. G. AFPACAO Structural Engineering Division Department of Civil Engineering Indian Institute of Technology Madras Chennai - 600 036, India

IIT Chennai Certified





STRUCTURAL ENGINEERING LABORATORY DEPARTMENT OF CIVIL ENGINEERING

INDIAN INSTITUTE OF TECHNOLOGY MADRAS CHENNAI - 600 036. Email : garao@litm.ac.in

To, M/s. BEARDSELL LIMITED, 47, Greams Road, Chennai – 600006

Ph.D. (IISc)

Date: 10-12-2013.

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				00	

IGBC & BMTPC CERTIFICATE

BEARDSELL LTD QUIKBUILD CONSTRUCTION AWARDED 'PLATINUM' GREEN CERTIFICATION BY IGBC

Indian Green Building Council (IGBC)

hereby certifies that

Quik Build Demo Farmhouse

has successfully achieved the Green Building Standards required for the following level of certification under the IGBC Green Homes Rating System

IGBC Green Homes Platinum August 2014

CII

dederation of Indian Indush

Sharukh Mistry Chairman, IGBC Green Homes Rating

Dr Prem C Jain Chairman, IGBC

5. aur S Raghupathy

bull an Grean Building Council

Executive Director, CII-Godrej GBC

bmlpc



निर्माण सामग्री एवं ग्रौद्योगिकी संवर्द्धन परिषद् anan alv कही गरीनी वयापन मंत्रावर, भारत मरकार Building Materials & Technology Promotion Council "No? BMT/CPMT?PACS=QBP/2013 of Indee Dated: 13th January, 2017

QuikBuild

Construction System

Sh. S. Dhandapani, Vice President, M/s Beardsell Ltd. 47, Greams Road, Chennai 600 006

Subject: Performance Appraisal certificate for QuikBuild Panels No. 1019-S/2015 -- Renewal -- reg.

Sir,

With reference to your letter dated 15th April, 2016 on the subject cited above, it is to inform that the Technical Assessment Committee (TAC) in its Meeting held on 28th December, 2016 has further extended renewal of the Performance Appraisal Certificate (PAC) No. 1019-S/2015 for QuikBuild Panels for a period of two years w.e.f. 24.04.2016 subject to the condition that the pre-mixed cement based plaster should be laid on each side of minimum 45 mm thick of M30 grade or above as required from environmental exposure conditions.

This is as per the deliberations made in the 11th Technical Assessment Committee (TAC) Meeting held on 28th December, 2016 for approval and renewal of PACS, it was stated that M/s Schnell Home, Italy has got the Fire Performance Evaluation of a Symmetric, Load-Bearing Wall Assembly and Fire Resistance Testing of Floor/Ceiling assembly conducted recently by Western Fire Center, INC, Washington, USA, concrete/plaster layers totaling a nominal 45 mm thickness on each side of the foam core, passed all requirements of the 1-hr fire endurance test according to ASTM E119. It was therefore, agreed that for all the technologies having Expanded Polystyrene Core Panels, pre-mixed cement based plaster should be laid on each side of minimum 45 mm thick of M30 grade or above as required from environmental exposure conditions.

The endorsement of renewal of the above PAC is enclosed herewith,

Thanking you

Yours faithfully,

(A. K. Tiwari) Chief (PMT)

Encl.: As above

हम हिन्दी में किये गये पत्राचार का स्वामत करते हैं।

कोर 50, प्रथम तल, मारत पर्यायास केन्द्र, लोदी रोड, नई दिल्ली – 110003; दूरमाम 91–11–24636706; फॅक्स 91–11–24642848 Core 5A, Tet Floor, India Habitat Centra, Lodi Road, New Dathi - 110 003; Tel: 91-11-24636706; Fax: 91-11-2464 2849 E-mail: hmtpc@det2.vari.net.in Weballs: www.hmtpc.org

CSIR-CBRI RECOMMENDED THE TECHNOLOGY



Manual for Expanded Polystyrene (EPS) Core Panel System and its field Application

Sponsored By

Ministry of Housing and Urban Poverty Alleviation, Government of India







CSIR – Central Building Research Institute Roorkee June 2017



CHAPTER -1 INTRODUCTION TO EPS CORE PANEL SYSTEM

1. Introduction

Expanded Polystyrene (EPS) core Panel system is a modern, efficient, safe and economic construction system for the construction of buildings. These panels can be used both as load bearing as well as non-load bearing elements.

EPS core panel is a 3D panel consisting of 3-dimensional welded wire space frame provided with the polystyrene insulation core. Panel is placed in position and shotcrete on both the sides.

The EPS panels consist of a 3-dimensional welded wire space frame utilizing a truss concept for stress transfer and stiffness as shown in Fig. 1.1.

EPS panel includes welded reinforcing meshes of high-strength wire, diagonal wire and self-extinguishing expanded polystyrene uncoated concrete, manufactured in the factory and shotcrete is applied to the panel assembled at the construction site, which gives the bearing capacity of the structure.

EPS panel after shotcrete has the following five components (as Fig. 1.1):

- The outer layer of shotcrete.
- ii. Welded reinforcing mesh of high wire.
- iii. The core of expanded polystyrene sheet.
- iv. Diagonal wire (stainless or galvanized wire).
- v. The inner layer of shotcrete.

The weided mesh fabric connected piercing polystyrene with truss of steel wire, welded to the welded fabric at an angle. It gives a rigidity spatial structure, and simultaneously prevents polystyrene core shifting.

CSIR-CBRI RECOMMENDED THE TECHNOLOGY





Fig 1.1: Typical cross section of wall panels

Individually welded internal strut wires or diagonals extend through the panel core between each surface. These galvanized strut wires are welded continuously in the required spacing so they form, with the welded wire fabric, into a triangulated truss system which greatly increases the panel strength.

EPS panel is a versatile structural element designed for floors, walls, partitions, roof and stairs. Fig. 1.2 & Fig. 1.3 shows the welded reinforcing mesh of the EPS panels at different cross-sections.



Fig 1.2: Reinforcing mesh expanded polystyrene core and diagonal wire.



Fig 1.3: Welded reinforcing mesh 3-D panel without expanded polystyrene core.

The typical EPS panel is generally manufactured with dimensions of 1200 m width, 3000 mm length and over all thickness range of 80-230 mm.

The panels are finished at the site using minimum 30 mm thick shotcreting of cement & coarse sand in the ratio of 1.4 applied under pressure. The shotcreting coat encases the EPS Core with centrally placed steel welded wire mesh. Some of the advantages of the EPS Core panel systems are as follows:

- i. Reduce the cost of construction
- ii. Reduce Construction period
- Reduce transport cost. Light weight panels: do not requires cranes and other heavy construction equipment. (A Standard panel of size (1.2×3) m without shotcrete weighs 20 kg).
- iv. The installation does not need heavy construction equipment.
- Ensure high levels of thermal insulation, sound insulation, as well as sanitary and fire safety.
- vi. EPS 3-D panels allow no additional cost to erect buildings in areas with moving soil, especially heaving, subsidence, frozen ground, and remote areas.
- vii. Strength and durability used extruded polystyrene virtually inert and does not absorb moisture, is durable and resistant to decay.

The EPS Core panel system is environment friendly and aesthetically appealing. It can be constructed quickly resulting in savings in construction time and money. The technology has been in use successfully in many African as well as European countries with involvement of different agencies.

QUIKBUILD



PM PUSHES 3D TECHNOLOGY TO SPEED UP PMAY PROJECTS



Last Published: Thu, Jul 13 2017. 10 35 AM IST

Narendra Modi pushes for 3D construction technology to speed up housing mission

Modi asks ministry for urban development to look at 3D construction technology in 25 major cities to speed up construction of houses under Pradhan Mantri Awas Yojana



Currently, approximately 1.25 lakh houses under the urban housing mission are being built using pre-fabricated technologies. Photo: iStock **New Delhi:** To speed up construction of houses under Pradhan Mantri Awas Yojana (Urban), Prime Minister Narendra Modi has asked the central ministry for urban development, housing and urban poverty alleviation to look at 3D construction technology in 25 major cities.

Modi was reviewing the progress of the housing mission during a PRAGATI meeting on Wednesday. PRAGATI is an initiative undertaken by the Prime Minister to track the progress of various schemes and functioning of the central government.

According to a few officials aware of developments in the meeting, the Prime Minister has asked the central ministry for urban development to organize a workshop with various stakeholders, including Indian and global companies associated with 3D construction, to promote this new technology. The officials did not want to be named.

Through 3D technology, the pace of construction can be increased as it is based on pre-programming. Currently, approximately 1.25 lakh houses under the urban housing mission are being built using pre-fabricated technologies.

The government believes that the use of 3D technology will not only speed up the process of construction but also reduce cost



NATION

USE 3D CONSTRUCTION TECH IN 25 BIG CITIES: PM TELLS MIN

Thursday, 13 July 2017 | PNS | New Delhi

Prime Minister Narendra Modi on Wednesday directed the Ministry of Housing and Urban Affairs to give a fillip to construction of affordable houses using 3D

construction technology in 25 major cities to begin with.

The Prime Minister's direction came when he was informed that about 1.25 lakh houses under PMAY (Urban) are being built using pre-fabricated technologies.

Sources said that the Prime Minister has suggested organising a workshop with global companies associated with 3D construction technology, Indian companies and other stakeholders to promote this new technology that enables quick construction of houses based on pre-programming.

Prime Minister's direction came during his review of progress of implementation of Pradhan Mantri Awas Yojana (Urban). "In the real estate sector, use of 3D technology can led to cost-effective projects while ensure efficient utilisation of labour, which is an expensive commodity in the country for the sector," sources said.

The Prime Minister also noted that the experience of 'Competition challenge' adopted under Smart City Mission proved useful and other departments also need to consider adopting this challenge route.

The PM was informed that during the last two years satisfaction level in respect of CPWD services has considerably improved further to introduction of new maintenance protocol, CPWD Sewa and Mobile App.

CRPF Tested for Bullet Proofing



BOARD PROCEEDINGS

Proceeding of Assembled at		A Board of Officers
A sounded at	-	RTC, CRPF Avadi
On	1	06/10/2017
For the purpose of	:	To conduct test firing on concrete Panel at baffle firing range, RTC, CRPF, Avadi
By the order of	:	IG(Trg) Dte. CRPF, New Delhi

Constitution of the Board

: Shri Praveen C. Ghag. DIG. RTC-Avadi	
Shri Ravindra Presad Comdt RTC-Avadi	
: Shri Salim Kumar S. Dy Comdt RTC-Avad	ii
	 Shri Praveen C. Ghag, DIG, RTC-Avadi Shri Ravindra Prasad, Comdt. RTC-Avadi Shri Salim Kumar S. Dv. Comdt. RTC-Avadi

 The board having been assembled pursuant to the orders of the IG(Trg) Dte, CRPF, New Delhi to conduct test firing on concrete panel at baffle firing range, RTC, CRPF, Avadi on 06/10/2017.

3. The board of officers conducted test firing on concrete panel at baffle firing range, RTC-Avadi on 06/10/17 from various distance and weapons, in the presence of Manager-Technical development, BEARDSELL Limited, Chennai. The result to this effect is drawn and attached as appendix-'A' & 'B' please.

Salim Kumar .S, D

Presiding officer :

Member - I

Ravindra Prasad, Comdt, RTC-Avadi

omdt, RTC-Avadi

Praveen C. Ghag, DIG, RTC-Avadi

Member – II



AKM Rifle				
Yards	Rounds	Remarks		
15	3 Rds	7 ^{1/2} Penetration		
25	4 Rds	5 ^{1/2} Penetration		
50	5 Rds	7" Penetration		

The second second second	5.56mm Insas	s Rifle
Yards	Rounds	Remarks
15	2 Rds	5 ^{1/2} Penetration
25	3 Rds	5 ^{1/2} to 6 ^{**} Penetration
50	5 Rds	7 [°] Penetration

7.62mm LMG				
Vards	Rounds	Remarks		
50	5 Rds	7" Penetration		



Ravindra (Member-II)

Praveen L (Presiding Officer)

THANK YOU

LET'S OPEN THE DOOR TO A GREEN WORLD

PRESENTED BY SHAIK MAHMMAD YOUSUF EMAIL:YOUSUF@BEARDSELL.CO.IN

CONT: 09490210301