



STABILITY ANALYSIS OF THE PRE CAST SLAB USING POROTHERM BLOCKS

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Abstract : Concrete is the one of the construction material produced world wide. Here is the method to make the effective use of the material. In a simply supported RCC slab, the upper part of the slab is subjected to compressive forces while the lower portion is subjected to tensile forces. Concrete is very good in compression while it is weak in tension. Hence the steel reinforcement is placed in the tension zone. The concrete in this portion is only for holding together the steel reinforcement and has no structural purpose. By choosing the filler material judiciously, we could save about 30-35% of concrete compared to a traditional RCC slab. A light weight filler material also reduces the dead load hence less steel reinforcement is required. In all we may expect to save about 25% of the cost .And for strength and stability conditions are tested for the slabs with normal reinforcement and steel fiber strips. Finally the stability analysis of the slab element is done and the comparative results will be given.

Keywords – Porotherm blocks, Flexture strength, compressive strength, Stability, Deflection.

I. INTRODUCTION

Porotherm is the clay block used for the masonry works. It acts as a light weight infill Material. Construction block technology offers a speedier, cost effective, environmentally sound alternative to conventional walling materials. It is based on the principle of densification of a lean concrete mix to make a regular shaped, uniform, high performance masonry unit. This technology can be easily adapted to suit special needs of users

by modifying design parameters such as mix proportion, water/cement ratio and type of production system. To make the effective usage of the building materials like concrete and steel .And to have the stability to withstand the loads acting on the elements. The structure is long lasting with marvelous features. Pre-cast concrete roofs are smooth. This type of concrete in roofing and sunshade accessory will be resistant to the extreme weather condition.

II. AIM AND OBJECTIVE

The main objective

- To analyze the stability of the pre cast slab elements.
- To reduce the self weight of the slab elements.
- To reduce the cost.
- To make the better finish.
- To make the efficient use of building materials

III. DESCRIPTION OF THE POROTHERM BLOCKS



Fig-1 Showing the Porotherm blocks of the different sizes



Offering exceptionally fast, virtually dry construction, plus high strength and thermal efficiency, Porotherm is a modern clay block structural walling system with reassuringly traditional values. A natural progression from handmade bricks to engineered blocks; it is widely used and has been proven on millions of projects for over 30 years in Europe in both domestic and commercial applications, and is ideal for use on projects from single storey to Multiple-storeys.

Porotherm is a highly efficient alternative to other building materials such as timber, concrete or light steel frames and is suitable for a variety of construction applications. Each Porotherm block is a precision designed and engineered vertically perforated walling unit made from prepared clay, (with typically 20% recycled materials e.g. sawdust, paper or minerals).

TYPES OF POROTHERM

Offering exceptionally fast, virtually dry construction, plus high strength and thermal efficiency, Porotherm is a modern clay block structural walling system with reassuringly traditional values.

There are two type of porotherm brick is available, thus are,

- POROTHERM HP (FRAMED STRUCTURE).
- POROTHERM VP (LOAD-BEARING STRUCTURE).

TABLE 1 SHOWING THE DETAILS OF THE POROTHERM BLOCKS

NAME	SIZE	WEIGHT	DENSITY
	mm(L,H,W)	kg	kg/m ³
HP400	400*200*200	11.6	694
HP150	400*150*200	8.5	733
HP100	400*100*200	6.2	788

IV. MECHANISM

Materials used to make the pre cast slab.

- Concrete (M30).
- Steel Reinforcement Bars(Fe415).
- Steel fibre strips.

➤ Porotherm Bricks.

The precast slab is a mechanism to replace the concrete in the tension zone. The filler material, thus, is not a structural part of the slab. By reducing the quantity and weight of material, the roof become less expensive, yet retains the strength of the conventional slab.

- Case 1: Nominal concrete mix and porotherm blocks with steel reinforcement.
- Case 2: Nominal concrete mix and porotherm blocks with steel strips as a reinforcement.

Progress of making the pre cast slab

- 1) Selection of the Porotherm HP 100mm thick block.

Porotherm Brick having the size of 400mm x 200mm x 100mm. This brick is used in slab.



Fig-2 Showing the data Porotherm blocks of the size 400*100*200

- 2) Shuttering size for the slab is taken as 1.5m x 0.6m



Fig-3 Showing the shuttering placement

Shuttering having the inner size of 1.5m x 0.6m. This is made by wood. Which this support by the brick and a cover of 20 mm.

3) Laying of the porotherm blocks in the shuttering



Fig-4 Showing the placement of the porotherm blocks

Porotherm Blocks are placed in between the shuttering ends, which are having the spacing of 140mm.

4) Reinforcement details

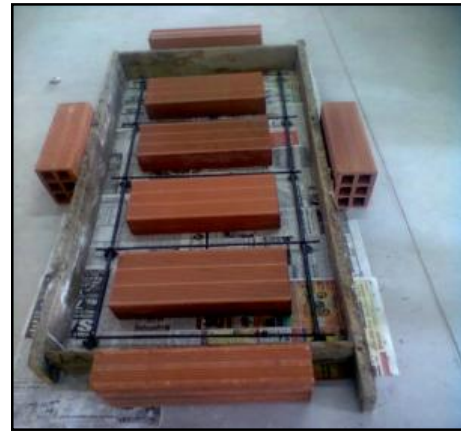


Fig-5 Showing the placement of the porotherm blocks and the steel bars.

Here we are using 10mm diameter bar in tension zone. 5 bars in shorter direction and 2 bars in longer direction. Cover of slab is 20mm.

5) Placing of concrete



Fig-6 Showing the casting of the Concrete slabs

Grade of concrete used in the slab is M30, which was placed over the reinforcement and the sides of Porotherm brick. Concrete was placed in compression zone. Reinforcements are provided in tension zone.

6) Curing process

Portable water is used for curing, which was done for 28 days. Jute fibre bags are preferred for the curing process. And the specimen is taken for the testing.



Fig-4 Showing the curing of the slabs

V. TEST RESULTS

Load vs Deflection

TABLE 1 SHOWING THE DETAILS OF TESTING OF THE SLABS

LOAD (kN)	DEFLECTION IN SLAB1(mm)	DEFLECTION IN SLAB2(mm)
2	3	1
3	13	5

Porotherm hollow bricks are placed between steel ribs and concrete is poured into the gap to make a filler slab. The structure requires less steel and cement and it is also a good heat insulator. Reduces use of concrete and saves cement and steel by about 40%. It is an ideal option for low-income users who have limited space for building a house. It also reduces the dead load of the slab and thereby providing the strength and stability to the structure. If steel strips are used as the reinforcement it improves the performance of the slab in terms of the strength and the stability to withstand the loads acting on to it.

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4	18	11
5	27	17
6	37	24

DEFLECTION CHART - (Load Vs Deflection)

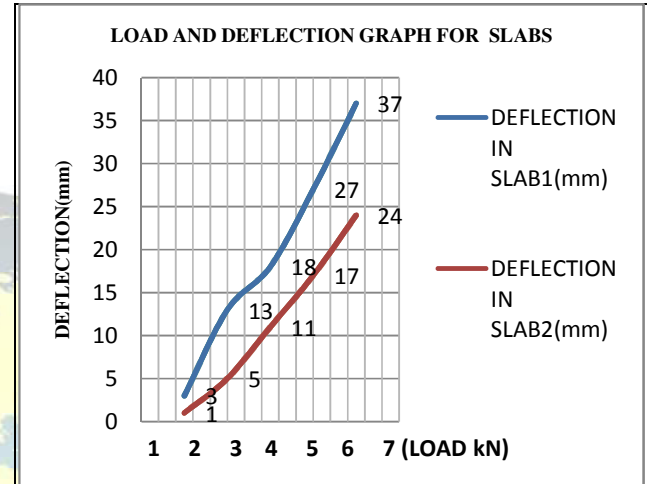


Fig-6 Showing the Load vs deflection graph of the Concrete slabs

VI. CONCLUSION

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