

Study on Porotherm Bricks

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Abstract: Brick are widely used construction and building material around the world. In this study, bricks are prepared from natural waste material which comprises of granite powder and rice husk ash. The main objective of this study is to reduce the quantity of clay with natural waste material. On the other side, proper and efficient disposal of natural waste is being the key factor in solid waste management in most of the Indian states. So, we are efficiently replacing the significant quantity of granite powder and rice husk ash in making lightweight bricks in appropriate proportions which gave compressive strength as similar as conventional brick. The average water absorption ratio and compressive strength obtained in this study are 15% and 3Mpa respectively.

KEYWORDS: Porotherm bricks, Clay, rice husk ash, granite powder, light weight brick, thermal insulation.



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INTRODUCTION

Porotherm is the clay brick which is used for the masonry works. It acts a lightweight infill material. Construction block technology offers a speedier, cost efficient, environmentally sound alternative to conventional walling material. The brick is the main material in the construction due to strengthen, durability, loading, compactness and lightweight. This brick provides excellent thermal insulation that is 45% higher than conventional walling material. Also, it has an exceptionally long life with zero maintenance. It improves the speed of construction without compromising on quality and safety. It would reduce its weight as well as selling price and makes its more affordable.

OBJECTIVES

- To compare the compressive strength of porotherm brick with conventional brick.
- To reduce the cost of construction.
- To make the efficient use of building material.

DESCRIPTION OF POROTHERM BRICKS

Offering exceptionally fast, virtually dry construction, plus high strength, and thermal efficiency. Porotherm is a modern clay brick structural walling system with reassuringly traditional values. A porotherm bricks is ideally used from single storey to multi-storey.

Porotherm brick is a technologically advanced smart clay bricks or walling material designed for all types of buildings such as multi-storey buildings, individual houses, large apartments, villas, education institutions, hospitals, hotels, and commercial complexes etc. it is an innovative product specially created for changing climatic conditions, keeping home naturally cool and comfortable throughout the year.



FIG: POROTHERM BRICK

Also, these bricks are environment friendly, cost effective and easy to handle. It has perforations as an integral design component to allow better thermal insulation for keeping homes naturally cool. It is

naturally strong; they provide exceptionally long life with zero maintenance.

The inherent strength of the porotherm brick makes the product fire resistant-which means it does not burn, as it is already fired at 1000 degrees centigrade and has a fire rating of F240(240 minutes). Since one porotherm brick equal to the space occupied by nine small ordinary bricks, leading to less mortar usage, making porotherm a favorite with builder's architects alike.

TYPES OF POROTHERM BRICKS

- Porotherm Horizontally perforated clay bricks(HP)
- Porotherm Vertically perforated clay bricks(VP)
- Porotherm Thermo bricks
- Porotherm HP grinded with Dry fix system.

POROTHERM HP CLAY BRICK

Porotherm HP clay hollow blocks are primarily used as infill masonry for non load bearing wall construction. The product is especially beneficial for high rise apartment buildings and has been extensively used across South India for the construction of Apartments, Independent Houses, Villas, Hospitals, Educational Institutions, Commercial Buildings and warehouses.

POROTHERM VP CLAY BRICK

Porotherm Vertically Perforated Clay Hollow Bricks (Porotherm VP) for up to G+ 1 structure

A hallmark of design and ingenuity when it comes to cost effective, safe and green construction practices. This new age wall solution helps you save on your steel and concrete expenditures as it allows buildings to be constructed without RCC frame structures. Ideal for up to Ground + 1 floors. The product is robust and 100% natural with thermal insulation property promoting comfortable indoor climate all year round. High compressive strength bricks $\geq 7 \text{ N/mm}^2$ enabling load bearing construction. Savings of structural cost as the concept eliminates the columns.

POROTHERM THERMOBRICKS

Porotherm Thermobrick has borrowed the principle of thermal insulation from nature, to become a unique walling material - one that keeps the interiors cool in summer and warm in winter! Specially formulated insulating material gives it a 'U' Value* of $0.6 \text{ W/m}^2\text{K}$, which results in superior thermal insulation that greatly improves the indoor comfort of the building. U' Value: $0.6 \text{ W/m}^2\text{K}$ makes Porotherm Thermobrick the best available energy efficient brick in the market.

POROTHERM HP GRINDED WITH DRYFIX SYSTEM.

Porotherm HP Grinded is the latest addition to the Porotherm Smart Bricks family - a result of Wienerberger's constant efforts to innovate. The product offers greater stability and comes as a combined solution with Wiesenerberger's revolutionary dry mortar system- Dryfix. The Dryfix System is a specially formulated adhesive that creates perfect bonding between the blocks specially when used with Porotherm HP G, enhancing the strength of the walls.

PROPERTIES OF POROTHERM BRICKS

1. the compression strength is greater than 3.5 Mpa
2. High thermal and sound insulation.
3. Low weight. It is lighter than traditional solid concrete block by 60%. high fire resistance.
4. Density ranges from 694 to 783 kg/m^3
5. Large in size but light in weight result in low dead load.
6. Water absorption is around 15.

ADVANTAGES OF POROTHERM BRICKS

1. GOOD STRENGTH

The compressive strength of porotherm brick is greater than 3.5 Mpa . The application of high temperature during its manufacturing process and the present of terracotta material excellent strength.

2. THERMAL INSULATION

Porotherm bricks have great thermal insulation which is obtained due to the perforation of the bricks.

3. HIGH DURABILITY

The compressive strength, fire resistance, and resistance against carbonation makes porotherm bricks highly

durable and has long life span. Water absorption is around 15% that is why risk of dampness, cracks or shrinkage of walls are substantially low.

4. COST-EFFECTIVE

Not only does the porotherm bricks save a lot of energy but also cut construction and operation cost. The usage of this type of brick would eliminate need for using AC in summer and heaters in winter, hence save energy. It does not require sand and cement for wall construction, hence it cut construction cost. Finally, it has zero maintenance cost.

5. ENVIRONMENTALLY FRIENDLY

The porotherm bricks have recycled content. Due to the fact that chemical materials are not used in its composition, so it would not use cause allergic issues.

6. SPEED OF CONSTRUCTION

Wall construction speed increases substantially when porotherm bricks are used. This is due to brick lightweight, ease of handling, and elimination of curing time since sand and cement is not needed for the construction of porotherm brick walls.

Additionally, it can be cut and chisel easily which makes fixture installation much easier. Finally, porotherm ensure clean and dry work site that is why it leaves no debris to be disposed.

MATERIALS USED

1. CLAY SOIL:

Clay soils are compounds of silica and alumina. Calcareous clay has calcium carbonate and will burn to a yellow or cream color. Non-calcareous typically contain feldspar and iron oxides and will burn to a brown, pink or red depending on the amount of iron oxide.

It is finely-grained natural rock or soil material that combines one or more clay minerals with traces of metal oxide and organic matter. It is plastic due to their water content and become hard, brittle, and non-plastic upon drying or firing.



FIG:CLAY SOIL

2. GRANITE POWDER:

Granite powder is a byproduct in granite polishing industries while cutting into desired shapes. It belongs to the igneous rock family. Granite industry products around 18 million tones waste per annum. The physical properties of granite powder are similar to the natural sand; hence it can be used in replacement of natural sand. Granite powder is locally available waste material hence it is possible to make economical brick.



FIG GRANITE POWDER

3. RICE HUSK ASH

Rice milling industry generates a lot of rice husk during of milling of paddy which comes from the fields. This rice husk ash is mostly produced by burning rice husk between 600-700 degrees Celsius temperature for 2 hours. Rice husk ash is about 25% by weight of rice husk when burnt in boilers. It is estimated that about 70 million tones of rice husk ash are produced annually worldwide.

This husk contains about 75% organic volatile matter and the balance 25% of weight of this husk is converted into ash during the firing process, is known as a rice husk ash (RHA). It contains of non-crystalline silicon dioxide.



FIG: RICE HUSK ASH

CONCLUSION:

- In porotherm brick, it is possible to add granite powder and rice husk ash including water.
- Usage of granite powder and rice husk ash has reduced and weight and cost of brick.
- Both rice husk ash and granite powder is a good binding agent with the clay

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