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UTILISATION OF GRANITE POWDER IN POROTHERM BRICKS WITH THE APPLICATION OF SILICONE SELANT AS A WATER PROOFING AGENT

MS. J. PRASANA JENIFER GOLDA

Civil Engineering Associate Professor Sethu Institute Of Technology Kariyapatti, Tamil Nadu, India

A .GANESHAN

Civil Engineering (UG) Sethu Institute Of Technology Kariyapatti, Tamil Nadu, India

S.V.DINESH SUBBAIAH

Civil Engineering (UG)

Sethu Institute Of Technology Kariyapatti, Tamil Nadu, India

S.MANIKANDAN

Civil Engineering (UG)

Sethu Institute Of Technology
Kariyapatti, Tamil Nadu, India

N.DHANASEELAKUMARAN

Civil Engineering (UG)

Sethu Institute Of Technology
Kariyapatti, Tamil Nadu, India

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 efficient 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 obtain in this study are 15% and 3MPa respectively.

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 strength, 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 it more affordable.

LITERATURE REVIEW :

- This paper shows the study that, the Porotherm Blocks used here are ready comprising of Granite Powder and Rice Husk Ash. because the main objective was to scale back the number of Clay. they're with efficiency exchange Clay with the Granite powder and Rice Husk Ash to form light-weight bricks that provided a similar Compressive Strength because the typical Bricks.
- This Porotherm block was discovered to be associate degree Innovative product that was created specially for dynamical climate and keeping homes naturally cool and cozy throughout the year. The Blocks were additionally discovered to be Environmental Friendly, price Effective with Zero Maintenance and simple to Handle.
- The Strength of the Porotherm Block created the merchandise hearth Resistant since it's already discharged at a thousand Degrees Anders Celsius throughout its manufacture, and incorporates a hearth Rating of 240 Minutes (F240)
- In The Water Absorption take a look at, the Blocks that have water Absorption but three-d are referred to as as glassy.
- The share of Water Absorbed by the Brick shouldnt exceed two hundredth..
- After varied Trials, the share of Water Absorption didnt exceed two hundredth with success. because it was tested with a pair of, four- dimensional.

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.

MATERIALS USED :

CLAY SOIL :

- Clay soils are compounds of silica and alumina. Calcareous clays have calcium carbonate and will burn to yellow or cream color.
- Non – Calcareous typically contain feldspar and it is finely graded natural rock or soil material that combines one or more clay materials that combines one or more clay minerals with traces of metal oxides and organic matter.

It is plastic due to their water content and become hard, brittle and non-plastic upon drying or firing.

GRANITE POWDER :

Granite powder is a byproduct produced in granite polishing industries while cutting into desired shapes. It belongs to the igneous rock family. Granite industry produces around 18 million tones waste per annum. The physical properties of granite powder is 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.

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 degree Celsius temperatures 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 tons of rice husk ash is produced annually worldwide.

SEALANT :

❖ When it comes to [selecting the finest masonry sealer](#) for sealing stone, brick or concrete, it's crucial to first understand the numerous types of sealers. Understanding the many forms of masonry sealers can help you determine which one is best for your project.

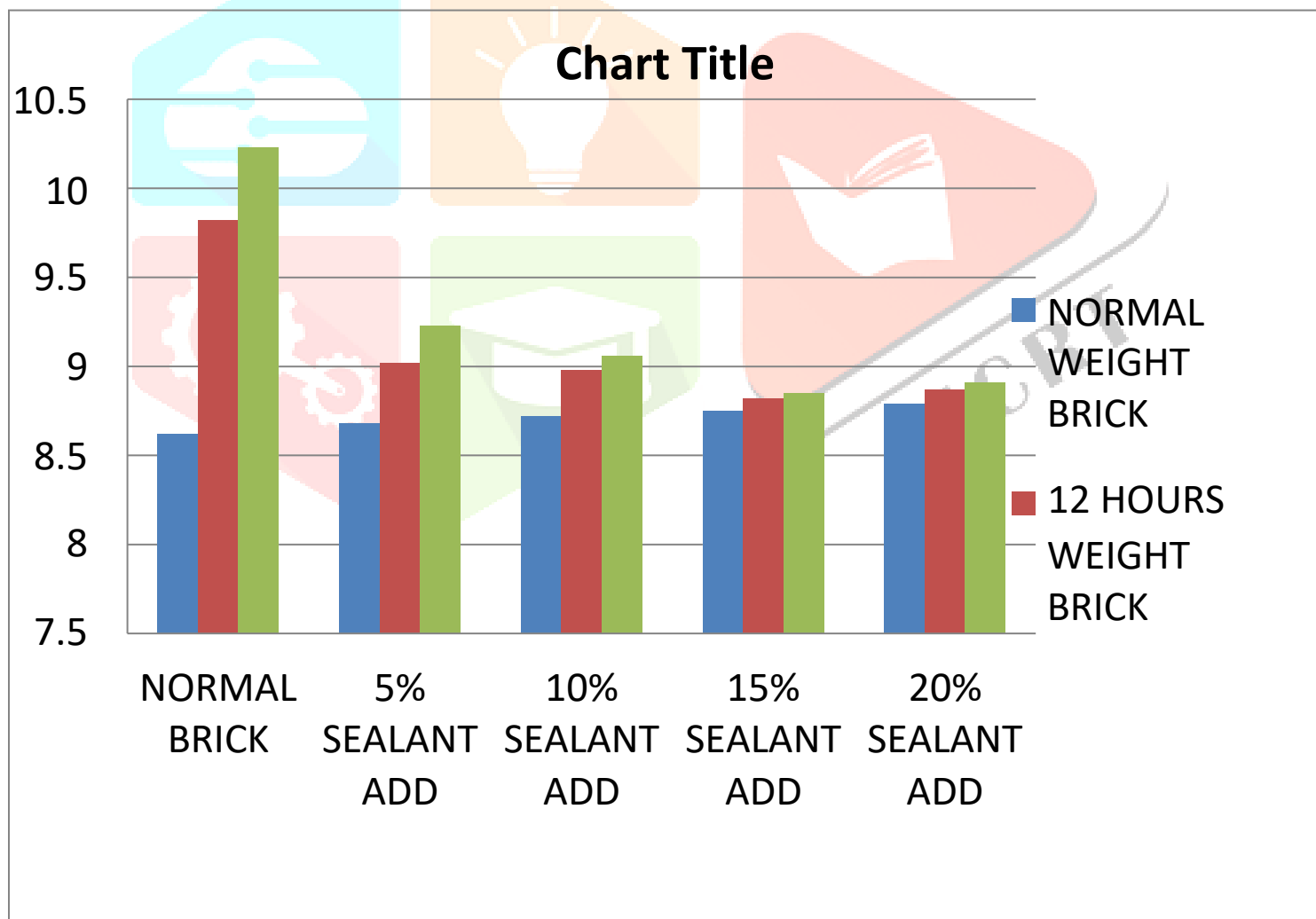
❖ [Silane/Siloxane sealers](#) provide the greatest benefit when it comes to protecting all masonry materials, including stone, brick, paver and concrete. They chemically react with the surface to form a hydrophobic barrier within the pores. They help minimize water absorption, mold and mildew formation, staining and deterioration caused by moisture absorption.

WATER ABSORPTION TEST:

- ✓ The water absorption test on bricks is conducted to determine durability property of bricks such as degree of burning, quality and behavior of bricks in weathering. A brick with water absorption of less than 7% provides better resistance to damage by freezing.
- ✓ The water absorption by bricks increase with increase in pores. The degree of compactness of bricks can be obtained by water absorption test, as water is absorbed by pores in bricks. So, the bricks, which have water absorption less than 3%, can be called as vitrified. This test provides the percentage of water absorbed by the brick and it should not exceed 20% of average weight of dry bricks.

WATER ABSORTION RATIO OF POROTHERM BRICK :

BRICK % VALUE	NORMAL BRICK	WEIGHT	12 HOURS WEIGHT BRICK	24 HOURS WEIGHT BRICK
NORMAL BRICK	8.62		9.82	10.23
5% SEALANT ADD	8.68		9.02	9.23
10% SEALANT ADD	8.72		8.98	9.06
15% SEALANT ADD	8.75		8.82	8.85
20% SEALANT ADD	8.79		8.87	8.91



COMPRESSIVE STRENGTH TEST:

Compressive strength tests on bricks are carried out to determine the load carrying capacity of bricks under compression. This test is carried out with the help of Compression Testing Machine. Bricks are generally used for construction purpose hence it is important to know the Compressive strength to determine the sustainability of construction.

$$\text{Compressive strength (N/mm}^2\text{)} = \frac{\text{Maximun load at failure in N}}{\text{Avg.area of the bed faces in mm}^2}$$

COMPRESSIVE STRENGTH FOR POROTHERM BRICK :

MIX DESIGN RATIO	LOAD (IN KN)	COMPRESSIVE STRENGTH (IN N/□□□)
NORMAL BRICK	3.95	4.2
5% SEALANT ADD	4.0	4.95
10% SEALANT ADD	4.15	4.8
15% SEALANT ADD	4.3	4.75
20% SEALANT ADD	4.5	4.92

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 weight and cost of brick.
- Both rice husk ash and granite powder is a good binding agent with the clay
- Silane /siloxane sealers provide the greatest benefits when it comes to protecting all masonry materials including stone

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