American Journal of Engineering Research (AJER) ***2018***
American Journal of Engineering Research (AJER)
e-ISSN: 2320-0847 p-ISSN : 2320-0936
Volume-7, Issue-6, pp-332-335
www.ajer.org
Research Paper Open Access

Determination of Water Absorption Rate of Cement Blocks and Burnt Bricks for Building In Makurdi Swamp Areas

[1]Ochang MB, [1]Azande TS, [2]Mee AU, [3]Etungo RO and [1]Takor T.
1 *Physics Department, Federal University of Agriculture, Makurdi, Benue State.*
2 *Physics Department, Federal College of Education, Obudu, Cross River, State.*
3 Science Laboratory Technology Department, Nigerian Army Institute of Technology & Environmental Studies, Makurdi, Benue State
Corresponding Author: Ochang MB

ABSTRACT: *This research work involves the determination of water absorption rate of burnt bricks and cement blocks that are used to build in Makurdi swamp areas. A total of fifteen samples of the specimen (burnt bricks and cement blocks) were collected, five blocks of cement of nine inches , five blocks of cement of six inches and five of burnt bricks respectively. Their rate of absorption of water by mass were determined using the RILEM and BS CP11.1 and ASTM C67-07) standard procedures. The result shows their average percentage water absorption to be 9.4%, 11.5% and 9.5% for nine inch blocks, six inch blocks and burnt bricks respectively. It is however recommended that the nine inches blocks and burnt bricks should be used for building in Makurdi swamp areas because of their low average percentage water absorption by mass. And that irrespective of the water absorption rates, cement blocks and burnt bricks should be treated with internal water repellents during or after moulding. Moreover government should ensure that acceptable standards for moulding of cement blocks and burnt bricks be observed by the blocks making factories.*

KEYWORDS: *Burnt-bricks, cement blocks, water absorption rate and RILEM test*

Date of Submission: 14-06-2018 Date of acceptance: 29-06-2018

I. INTRODUCTION

A building is a structure itself and the act of making it. A building is a structure that has a roof and walls stands more or less permanently in one place [10]. Every building project involves the choice of building materials or means used for the selection of building materials [6]. In choosing the right material (s), there is always a single definite criterion of selection factors.

Early building materials were perishable such as leaves, branches and animal hides. Later more durable natural materials such as clay, stone, timber and finally synthetic materials such as bricks, concrete, metals and plastics were used. Another one is a quest for building of ever greater height and span. This was made possible by the development of stronger materials and by the knowledge of how materials behave and how to exploit them to greater advantage.

Inspite of the number of advanced tools or systems in building, the seamless flow of knowledge and information about the sustainability and substantial use of local and recycled building materials across the building and construction sector is still impeded by a number of factors. The data or available information on local and recycled building materials have usually been drawn from either semi-structured or unstructured information and knowledge systems, with recourse to a very limited range of factors or variables. The full potential of these materials or products has not been empirically considered, despite a wealth of community based action for low impact development taking place at both the local and international levels in the social economy[7],[17].

There is an urgent need for new technologies to optimize the use of low impact building materials; it is also true that there are many technologies or systems, already in use [5]. Many have descended from an earlier wave of sustainable housing activism and development, prompted by the 1970's environment movement [5] . However, there are tremendous numbers of factors that influence whether or not a material produced locally or recycled is better for environment, including the level of environmental impact, the level of wetland etc. This seems to suggest that there is a need for developing a systematic material selection system that will enable

builders identify and patronize the relevant criteria to effectively and accurately evaluate the tradeoff between environmental and economic issues during material selection.

The seeming increase in the population of Makurdi inhabitants consequently increased the demand of land for building purposes. Makurdi lands composed of dry and wet areas. Some people acquire land in the wet(swampy) areas while others in the dry areas for building of houses and other structures. It is observed over the years that people use burnt bricks or cement blocks of different sizes in raising structures in the swampy areas of Makurdi. The absorption of water by building block (cement or burnt bricks) is a major challenge as it affects the durability of a building. This is because water weakens the foundation of the building thereby causing an eventual collapse of the building.

The question now is which of these blocks (cement or burnt bricks) is more suitable to be used in the swampy areas in terms of water absorption ? It is against this background this study seeks to determine the water absorption rate of burnt bricks and cement blocks used in raising buildings in swampy areas.

Among other advantages, this study will provide information on which of either bricks or cement blocks absorbs water more than the other. Moreover, the information will equip builders to use in order to reduce or control water absorption by either cement or burnt bricks

II. MATERIALS AND METHOD

Sample Collection

Cement blocks of six(6) inches and nine (9) inches were collected from five different cement making factories in Makurdi metropolis. This is because almost all the cement blocks used in building in the swamp areas in Makurdi are bought from these factories. The 9 inches cement blocks were sample-coded $A_1, A_2\ A_3, A_4 and\ A_5$ from the five different factories respectively. Also, five of the 6 inches cement blocks were sample-coded as $B_1, B_2\ B_3, B_4 and\ B_5$ respectively. The burnt bricks were also obtained from five different bricks making sites and sampled as $C_1, C_2\ C_3, C_4 and\ C_5$ respectively.

Procedure

To determine the water absorption rate by all the blocks samples, the RILEM(The International Union of Testing and Research Laboratories for Materials and Structures), ASTM(American Society for Testing and Materials and BS(British Standard) procedure was used. In this procedure, the mass of the dry block samples were measured with the sensitive weighing balance (SN 042811) with and accuracy of 0.1g and recorded as M_1. After which the block samples immersed in water for 24hours in accordance with RILEM and ASTM specifications. The mass of the wet blocks were measured also with the sensitive weighing balance and recorded as M_2 . The water absorption rate(W) is obtained using the relation $W(\%) = \frac{M_2 - M_1}{M_1} \times 100.$

III. RESULTS

The experimental results of water absorption of different sizes of cement blocks and burnt bricks are presented in the table below.

TABLE 1: Water Absorption by Cement Blocks and Burnt Bricks

Sample	Dry Block mass M1 (Kg)	Wet Block mass M2 (Kg)	Mass of water absorbed (Kg)	Absorp. Rate (%)
A1	23.859	25.648	1.789	7.50
A2	23.654	26.177	2.523	10.67
A3	23.734	25.766	2.032	8.56
A4	23.696	25.959	2.263	9.55
A5	23.634	26.097	2.463	10.42
B1	15.855	17.751	1.896	11.96
B2	15.441	17.652	2.211	14.32
B3	15.316	17.981	2.665	17.40
B4	16.132	17.021	0.889	5.51
B5	15.936	17.286	1.35	8.47
C1	3.339	3.762	0.423	12.67
C2	3.097	3.396	0.299	9.65
C3	3.217	3.553	0.336	10.44
C4	3.023	3.225	0.202	6.68
C5	3.096	3.301	0.205	6.62

The average water absorption rate of 9 inches blocks (A1-A5) = 9.4%
The average water absorption rate of 6 inches blocks (B1-B5) = 11.5%
The average water absorption rate of burnt bricks (C1-C5) = 9.5%

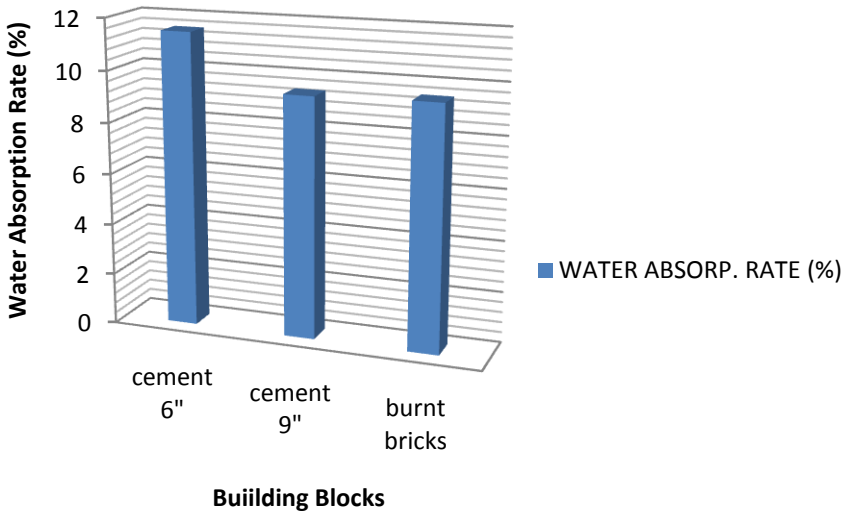

Fig.1: water absorption rate of building blocks

IV. DISCUSSION

The results as shown in table1 and fig.1 above indicate that the water absorption rate of burnt bricks ranges from 6.7% to 12.7% with an average absorption rate of 9.5%. This is within the range of 20% as specified by Rajput,2006. For 9 inches and 6 inches cement blocks, the water absorption rate ranges between 7.5% to10.4% and 5.5% to17.4% respectively. This is in conformity with the 15% to 20% of the Indian Standards(1998). The different water absorption rates of cement blocks and burnt bricks suggests that the different bricks and cement blocks making factories do not have a unified standard process of cement blocks and burnt bricks production.

V. CONCLUSION

We can say conclusively that the 9 inches cement blocks and the burnt bricks are more suitable to use in building houses and other structures in swampy areas (wetland) as their water absorption rate is lower compared to that of 6 inches cement blocks.

RECOMMENDATIONS

Based on the findings of the study, and in order to promote a sustained and durable structures in swamp areas, the following suggestions are hereby proffered:

i. 9 inches blocks should be used in laying foundations of buildings and the burnt bricks used in erecting the walls.
ii. Irrespective of the water absorption rates, cement blocks and burnt bricks should be treated with internal water repellents during or after moulding or production.
iii. The government should ensure that acceptable standards for moulding of cement blocks and burnt bricks be observed by the blocks making factories. This is because cement blocks and burnt bricks under study showed different water absorption rates which may be attributed to different processing standards or methods.

REFERENCES

[1]. ASTM C67-07a (2007); Standard Test Methods for Sampling and Testing Brick and Structural Clay tile.
[2]. Cesar, E. and Gonzalez, M. (2004); Physical Properties of Unfired, Extruded Clays Reinforced with Low cost Additives.
[3]. Darisu, A.O. and Onanye G.H. (1987); Local Sourcing and Production of Soil Blocks, Burnt Clay Bricks Lime Pozzalan and Fire Based Roofing Sheets in Nigeria.
[4]. El-Kaushal, K.(2007) Material Engineer "Testing of Concrete Blocks"(accessed Jan., 2016).
[5]. Fernandez, J.E (2006); Material Architecture: (Architectural press, Oxford UK)pp 44-55.
[6]. Florez, L., Castro, L.D., Irizarry, J (2010): Impact of sustainability perception on purchasebility of materials in the construction projects. Pp 1447-1456.
[7]. Hulme, J. and Radford, N (2010); Sustainable supply chains that support local economic development.
[8]. IS:2185-1979(1998) Specification for concrete masonry units part one Hollow and Solid concrete blocks, Bureau of Indian Standard, New Delhi, India.
[9]. Krishnamoorthy, N.R., Mastanaiah, G. and Gopolakrishnayya, A. (1994);"Characteristics of flyash treated black cotton soil, bricks. Journal of Institution of Engineers 74. Pp 184-186.

[10]. Max, J.E and David, M.M. (2002); "Geographic Information Science".
[11]. Mike, C. (2013); Soil Porosity. Science Fair Survival Guide.
[12]. Nwachukwu, C.E. and Ojusu, J.O. (1988); "Local building materials for development and prospects.
[13]. Olawuyi, B.J., Olusola, K.O, Ogunbode, E.B and Kyenge S.S (2011); "Performance Assessment on Makurdi Burnt Bricks".
[14]. Opawoye, E.U (2014); Permeability Test on Locally Made Burned Bricks Using in Lining Hand Dug .
[15]. Rajput, R.K. (2006); Engineering materials S. Chand and company limited New Delhi India.
[16]. Sarangapani, G.,Venkatarama, B.V. and Jagdish, K.S. (2002); "Structural characteristics of bricks mortars and masonry, Journal of structural Engineering. 29(2). Pp 101-107.
[17]. Seyfang, G. (2009); "The new economic of sustainable consumption-seeds of change.
[18]. Wilson, M.A., Carter, M.A. and Hoff (1999); "British standard and RILEM Water Absorption Test (CPC11.1). A Critical Evaluation.

Ochang MB "Determination of Water Absorption Rate of Cement Blocks and Burnt Bricks for Building In Maude Swamp Areas." American Journal of Engineering Research (AJER), vol. 7, no. 06, 2018, pp. 332-335.