
**QUALITY ASSURANCE OF HOLLOW SANDCRETE BLOCKS PRODUCED BY BLOCK
MOULDING FACTORIES IN GOMBE METROPOLIS**

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Abstract

The quality assurance of hollow sandcrete blocks is necessary in Gombe Metropolis due to the spring up of block moulding factories in order to meet up the demand in the building industries by the governments, corporate bodies and individuals. Quality of blocks produced in local moulding factories in Gombe metropolis, were investigated. Blocks from six different block moulding factories were obtained and cured for 28 days in the laboratory. The blocks were weighted before they were crushed individually to determine the compressive strength ranges from 0.53N/mm² to 0.86N/mm² and when compared with the compressive strength of 2.76N/mm² (load bearing) and 1.72N/mm² (Non-load bearing) of blocks as specified by Nigeria Industrial Standard Draft Code on blocks. The blocks failed to meet the required standard. Factors such as the use of obsolete equipment, engagement of unskilled labour, low level of workmanship and use of inadequate mix ratio were observed to contribute to the poor quality of produced sandcrete blocks. It is recommended that there should be close monitoring of block moulding factories by appropriate government Agency to enforce the required standard.

Introduction

Quality products and services delivery are essential in the competitive capitalistic economy. Manufacturers and service providers are deeply involved in producing quality products and services in order to control their share of the market. The demand for quality by consumers leads to the establishment of standard organizations both locally and internationally, this is to provide quality assurance in products.

The concept “quality assurance” is a statement expressing certainty of goodness or worth of a thing, act or a product. Quality assurance is the process of verifying or determining whether products or service meet or exceed customer expectations, (Deming, 2011). According to Wikipedia (2009) this concept has an engineering technology origin and was used to refer to planned and systematic production processes that provided confidence in products suitability for its intended purpose.

The general meaning of quality assurance is very applicable to the production function. It is the management of goods, services and activities from the input stage, through processes, to the output stage of production, (Onocha, 2002). Quality assurance aims at preventing quality problems and ensuring that only conforming products reach the customer. The characteristics of an effective quality assurance mechanism are:

An effective quality management system
 Periodic audit of the operation of the system,
 Periodic review of the system to ensure that it
 meets changing requirements, (Onocha, 2002).

It is clear therefore that an assurance process recognizes the need for a block moulding factory to accept responsibility for its own management processes. Quality assurance is a total, holistic process concerned with ensuring the integrity of outcomes. This places the responsibility for quality with the factory itself, and thus is expressed through its relationship with its customers. Quality assurance recognizes the autonomy of organizations and seeks to enhance their capacity to operate in a responsive way. The individual moulding factories have a responsibility of assuring the quality of their product and that is why the focus here is on quality assurance of hollow sandcrete blocks produced by block moulding factories in Gombe Metropolis.

According to Baiden and Tuuli (2004), over 90% of physical infrastructures in Nigeria are being constructed using sandcrete blocks. This makes sandcrete blocks a very important material in building construction. It is widely used in Nigeria, Ghana and other African countries as load bearing and non-load bearing walling units.

Sandcrete blocks comprise of natural sand, water and binder. Cement, as a binder, is the most expensive input in the production of sandcrete blocks. Osarenmwinda and Edigin (2010)

observed that sandcrete blocks are constructional masonry units that have been generally accepted to the extent that when an average individual thinks of building, the default mindset is the use of sandcrete hollow blocks.

The quality of sandcrete blocks are influenced by so many factors such as the constituent materials, the process adopted in manufacture, duration of curing, form and size of blocks. Samson, Elinwa and Ejeh (2002) identified that most of the sandcrete blocks used in the North Eastern part of Nigeria, are lower in strength as compared to their standard recommended values; they attributed the reason to the reduction in content in order to maximize profit at expense of quality. Anosike and Oyebade (2011) conducted a study on Sandcrete block and quality management in Nigeria. The result of the study carried out in Ota, Umuahia and Federal Capital Territory (FCT), shows that the block manufacturers did not conform to the Nigeria Industrial Standard (NIS) standard specifications.

The production of low quality blocks may have led to the increase in collapsed buildings in recent times (Aloa, 2002). This has led to the death of innocent individuals and loss of properties worth millions of naira. At present many block manufacturing industries operating in Gombe metropolis are not knowledgeable in sound engineering practices. The results of these are that substandard blocks are produced and these manifest themselves in the rate of deterioration and crack development in buildings.

Statement of the Problem

Despite the introduction of new materials such as life bricks, modified clay blocks, the use of sandcrete blocks in the construction industries has gained wide publicity. This is due to some of its characteristic properties such as strength, density, water absorption, shrinkage, durability. In addition to ease of handling, lower cost and technical know-how of the material. It has been observed that failures of masonry walls and cracks development are as a result of poor quality in block production and can be attributed to ignorance on the part of the manufacturers, the contractor and inadequate provision for enforcing code of practice.

Purpose of the Study

The purpose of this study is to find out the quality assurance in hollow sandcrete blocks produced by local moulding factories in Gombe metropolis. Specifically, to determine Compressive strength of sandcrete hollow blocks cured for 28 days in Gombe metropolis.

Significance of the Study

This study will be of immense benefit to Standard Organisation of Nigeria (SON) when they come

across the journal. This study will help the construction team in the building (construction) industry (Architects, Civil engineers, Builders and Structural engineers etc), to come out with a standard position on the use of sandcrete blocks for building construction. Also, the study is hoped to provide basic information to the authorities charged with the responsibility of monitoring and supervising construction projects.

Design of the Study

The study employed an experimental design to find out the quality assurance of hollow sandcrete blocks produced by block moulding factories in Gombe Metropolis.

Area of the Study

The area of this study is Gombe Metropolis, Gombe state, Nigeria.

Population of the Study

The research work involved the collection of three (3) blocks each with of dimension 450mmX150mmX225mm (18"X6"X9") from six (6) different local block factories located within Gombe metropolis, Nigeria and label A to F.

Instrument for data Collection

The instrument used for this experiment is an electro hydraulic testing machine (compressor) with a maximum load capacity of 1000KN. The bed faces of the hollow block were rubbed smoothly with trowel before the test was carried out, this is to ensure even distribution of applied load on the hollow block bed faces on the smooth iron plate of the compressor which is same size as the block which was placed on top of the block but which is wider and longer than the block at the bottom plate.

Validation of Instrument

The instrument was validated by experts in building technology Education from Colleges of Education Gombe and University of Nigeria, Nsukka.

Method of data Collection

The blocks were allowed to cure for 28 days before being tested to determine its compressive strength.

Method of data Analysis

The block to be tested is placed at the centre of point of applied load to ensure centralized loading (i.e. Axial loading) Prior to the compressive strength test, the weight of block and area (mm²) were noted. Load was applied to the block until it failed. The failed load was noted and recorded. The resulting compressive strength was determined using Equation. (1). Each test was carried out three (3) times and the average value determined

and recorded.

$$\text{Compressive strength} = \frac{\text{Maximum load at failure (KN)}}{\text{Cross sections of blocks (mm}^2\text{)}} \text{----- (1)}$$

Results

The result of investigation were obtained from the research question answered (table 1).

Research Question 1

What is the compressive strength of Sandcrete hollow blocks produced and cured for 28 days from local factories in Gombe Metropolis?

Table 1: Compressive Strength of Sandcrete Hollow Blocks produced and Cured for 28 Days from Local Factories in Gombe Metropolis.

Block Factories	samples	Weight (Kg)	Crushing Force (Kn)	Compressive Strength (N/Mm ²)	Average Compressive Strength (N/Mm ²)
A	1	18.1	30	0.67	0.66
	2	18.0	30	0.67	
	3	17.5	28	0.64	
B	1	18.9	22	0.46	0.55
	2	19.0	18	0.38	
	3	17.2	40	0.81	
C	1	16.2	20	0.43	0.82
	2	16.0	38	0.83	
	3	15.6	55	1.20	
D	1	15.2	20	0.54	0.62
	2	16.1	22	0.58	
	3	15.3	28	0.74	
E	1	19.7	40	0.88	0.53
	2	19.0	15	0.33	
	3	18.1	18	0.39	
F	1	19.7	30	0.65	0.86
	2	19.1	28	0.63	
	3	19.7	60	1.31	

The data presented in table 1 revealed test result of sandcrete hollow blocks compressive strength cured for 28 days from various local factories (A,B,C,D,E, and F). The result shows that the average compressive strength of the blocks ranged from 0.53N/mm² to 0.86N/mm². Blocks from factory F had the highest compressive strength of 0.86N/mm². The compressive strength of blocks produced by all the local block factories in Gombe metropolis did not meet Nigeria Industrial Standard draft code of block (NIS) which is a compressive strength of 2.76N/mm² (load bearing block) and 1.72N/mm² (non-loading bearing blocks) as required by Standard Organization of Nigeria (SON) and 2.78N2 (BS2028,1968).

Discussion of Result

The results of the test for hollow sandcrete blocks moulding factories in Gombe metropolis produced low quality blocks and from interviews with the local block factory workers, observation and investigation. In the block moulding factories

investigated in this study, it was observed that the level of workmanship was low and this affect the practice and operations that lead to inadequate mix proportion, improper method of curing, inadequate compaction, inadequate spacing among the blocks.

An average Nigeria business aims at maximizing profit. In their quest for profit, little or no attention is paid to the engagement of skilful personnel and use of good equipment. Virtually all the block moulding factories visited use cheap labour with outright disregard to qualified personnel to manage the enterprise and the equipment used by most are obsolete.

The type of raw materials used for the production of blocks also affects its quality. The standard mix proportion (cement to sand) was not adhering to by all the factories investigated in order to maximize profit. The aggregate was also not sieved to remove clay and silt and water used in factories was never

tested for portability. This affected the quality of the blocks produced.

From the survey carried out, on the block moulding factories used for this study, it was observed that the owners of the block moulding factories have little or no good knowledge concerning block making business thereby affecting the quality of block produced.

In the block moulding factories used for this study, no quality control measure was put in place to monitor the quality of blocks produced. There also seems to be no measure in place on the part of the standard organization of Nigeria (SON) and relevant standard regulating bodies to monitor at regular interval quality of blocks produced by the block making factories.

The result of this investigation were in agreement with results of Samson, Elinwa & Ejeh (2002), which identified that most of the sandcrete blocks used in the North Eastern part of Nigeria, are lower in strength as compared to their standard recommended values. The result of the study long ago was also in consonance with Florek (1985), who conducted a study on quality of hollow blocks produced in the Northern part of Nigeria. And the result of the study carried out on 306 blocks shows that the majority of produced blocks by the block moulding factories does not satisfy required standard.

Conclusion

The study of the quality assurance of sandcrete hollow block produced by local block moulding factories in Gombe metropolis have been carried out. It was observed that the blocks produced from these factories did not meet the recommended standard. Therefore, there is an urgent need for close monitoring of block moulding factories in the country by appropriate government agency to enforce the required standard.

Recommendations

Based on the findings of this study the following recommendations are made:

- i. Standard mix proportion should be adhered to in the production of blocks by local block moulding factories.
- ii. Adequate quality assurance measure should be put in place by the block moulding factories to ensure that blocks produced meet the minimum standard required.
- iii. The use of outdated block moulding equipment should be discarded for new modern equipment in order to boost production efficiency.
- iv. Skilled and qualified personnel should be used in the block moulding factories.

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