Engineering Consultancy Center
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مركز الاستشارات الهندسية
كليـــة الهندســـة
جامعـة عـين شمس

Date: 26 / 7 /2020

Report on:
Determination of Dry Density and Compressive Strength of Autoclaved Aerated Concrete Blocks Masonry Units.

Client	:	شركة دلتا بلوك DELTA BLOCK
Project	:	ابراج العلمين مدينة العلمين الجديدة ALAMIN TOWERS
Consultant	:	جماعة المهندسين الاستشاريين ECG
Contractor	:	اتحاد مقاولي سي سي& اتش ايه CCC& HA J.V.

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١ شارع السرايات - العباسية : ١١٥١٧ القاهرة ت / ف : ٢٦٨٣٠٧٧٢ محمول : ٠١٢٢٤٠٥٤٨٣٩
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Report on
Determination of Dry Density & Compressive Strength of Autoclaved Aerated Concrete Blocks Masonry Units.

Client : شركة دلتا بلوك DELTA BLOCK
Project : ابراج العلمين مدينة العلمين الجديدة ALAMIN TOWERS
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This report was prepared upon the request of Delta Block to determine the dry bulk density and compressive strength of the delivered specimens –Autoclaved Aerated Concrete Blocks AAC masonry units- used for wall construction at the headed project. Tests were conducted to measure both of density and compressive strength of delivered blocks according to ES: 1401/2005 Autoclaved Aerated Concrete Blocks and Flat Units. Tests is used for quality control to determine specimen conformance/to compare with the manufacturer specification .

1. Delivered Specimens:

Eight specimens 25 & 12 cms width were delivered to Masterlab, by client on his sole reponsibility on 14/7/2020. Blocks are classified as regular shaped masonry units, autoclaved aerated concrete light weight blocks for use in masonry wall constructions in accordance with: BS EN 771-4-2003, Specification for masonry units Part 4: Autoclaved aerated concrete masonry units. For material details, refer to attached technical data sheets for tested blocks. Table -1- presents a description of delivered blocks data and dimensions as per client's letter.

Table 1- Description of Delivered Specimens

No.	Item	Type	Qty	Nominal Dimensions (cms)		
				Width	Height	Length
1	A	Delta Block	4	25	20	60
2	B	Delta Block	4	12	20	60

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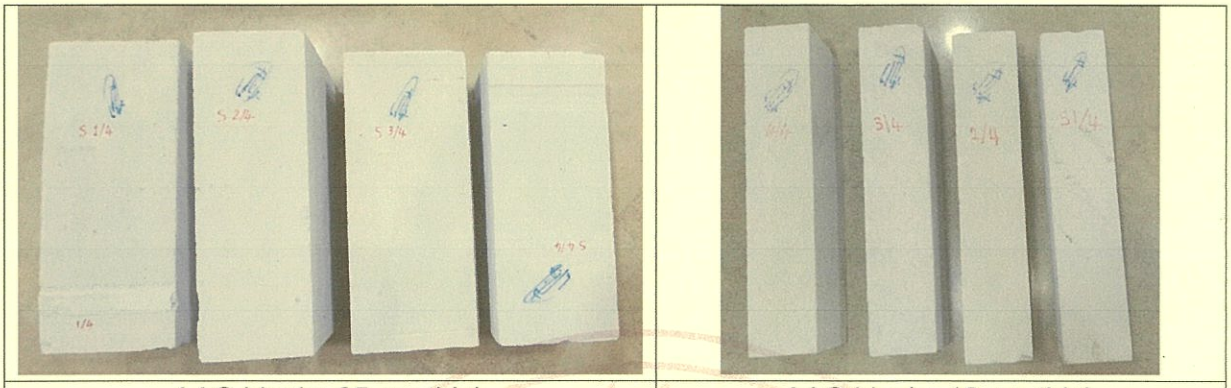

AAC blocks 25 cm thick	AAC blocks 12 cm thick

Photo 1- Delivered Specimens

2. Performed Tests

Tests were performed in accordance with the ESS 1401/2005 for masonry units.

Dry density for AAC masonry units: it was determined in accordance to article 7/2 for three pieces cut from three blocks. Then, density is assessed after drying to a constant mass $m_{dry,s}$ in a ventilated oven at a temperature of 105 °C. A calibrated balance capable of weighing to 15000g, with an accuracy of 1 g, used to determine sample weight.

Compressive strength for AAC masonry units:

Compressive strength of masonry unit B_{St} was determined in accordance to article 7/3 for 6 dried Cubes 10x10x10 cms cut from delivered samples. Load was applied parallel to the height direction of the blocks. Samples were tested in normal atmospheric condition. Loading rate was increased gradually in such a way to reach the maximum load within 1 minute.

Calculation of the compressive strength of masonry unit B_{St} for each specimen using the following formula:

$$B_{st} = B_{PR}\ x\ f$$

Where :

$B_{PR} = \frac{F}{A}$, F is the maximum applied load (N) & A is the specimen cross sectional area (mm^2)

B_{st} is the comp. strength for masonry block (N/mm^2)

B_{PR} is the comp. strength for test specimen (N/mm^2)

f is the shape factor for comp. strength grades = 1.1 as per table 4,

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3. Test Results for 25 cms thick units

Table 2- Results of dry density for 25 cms block units

Type	Sample	Nominal Dimensions	Volume	$m_{dry,s}$	Dry Density
		cms	cm^3	g	Kg/m^3
Delta Block 25 cms	1	9.9 x 10.0 x 10.0	990	506	511.1
	2	10.0x10.0x10.0	1000	515	515.0
	3	9.9x10.0x10.0	990	505	510.1
Mean value for dry density=					512.0

Table 3- Results of compressive strength for 25 cms block units

Type	Sample	Nominal Dimensions	Area A	Max. Load F	B_{PR}	B_{St}
		cms	cm^2	kg	Kg/cm^2	Kg/cm^2
Delta Block 25 cms	1	10.1x10.0x9.9	101.0	4012	39.7	43.7
	2	10.0x10.1x10.0	101.0	4040	40.0	44.0
	3	10.0x10.1x10.0	101.0	3822	37.8	41.6
	4	9.9x10.0x10.0	99.0	3795	38.3	42.2
	5	9.9x9.9x9.8	98.0	3726	38.0	41.8
	6	10.1x10.0x9.9	101.0	4014	39.7	43.7
Mean value for compressive strength=					38.9	42.8

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4. Test Results for 12 cms thick units

Table 4- Results of dry density for 12 cms block units

Type	Sample	Nominal Dimensions	Volume	$m_{dry,\ s}$	Dry Density
		cms	cm^3	g	Kg/m^3
Delta Block 12 cms	1	10.0x9.8x10.0	980.0	512	522.4
	2	9.9x10.1x10.0	999.9	514	514.0
	3	9.8x9.9x10.1	979.9	524	534.7
Mean value for dry density=					523.7

Table 5- Results of compressive strength for 12 cms block units

Type	Sample	Nominal Dimensions	Area A	Max. Load F	B_{PR}	B_{St}
		cms	cm^2	kg	Kg/cm^2	Kg/cm^2
Delta Block 12 cms	1	10.0x9.8x10.0	98.0	3912	39.9	43.9
	2	9.9x10.1x10.0	100.0	4130	41.3	45.4
	3	9.8x9.9x10.1	97.0	3850	39.7	43.7
	4	10.0x10.0x10.1	100.0	3825	38.3	42.1
	5	10.0x9.9x10.0	99.0	3745	37.8	41.6
	6	10.0x10.1x10.0	101.0	3933	38.9	42.8
Mean value for compressive strength=					39.3	43.3

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