ThermoLite

ThermoLite thermal Block:

Over decades, since the invention and manufacture of ThermoLite's main ingredient of Expanded Clay Aggregates in 1917 in America, it was adopted by the construction industry of countries known to suffer from harsh climate conditions (cold/warm, wet/dry, earthquakes, and hurricanes). The most important manufacturers and consumers known to take advantage of the attributes of these granules are all the Scandinavian countries, Northern Europe, and America.

ThermoLite's greatest ability is to act as a thermal damper, to regulate daily high and low temperature extremes, thereby reducing the overall energy requirements in buildings.

ThermoLite's ingredients are:

- Expanded clay aggregates, that is key to its thermal/sound insulation and lightweight properties.
- First class cement and additives that ensure its compressive strength and rigidity.
- Salt free sand.
- RO treated water.

Manufactured in rotary kilns, Expanded clay aggregates are porous ceramic products with a uniform pore structure of fine, closed cells and with a densely sintered, firm external skin that prevents water absorption to the degree of floating on it. The grains' internal cellular structure with thousands of air-filled cavities give ThermoLite its **thermal/sound insulation** and light weight properties thereby resulting in the following benefits:

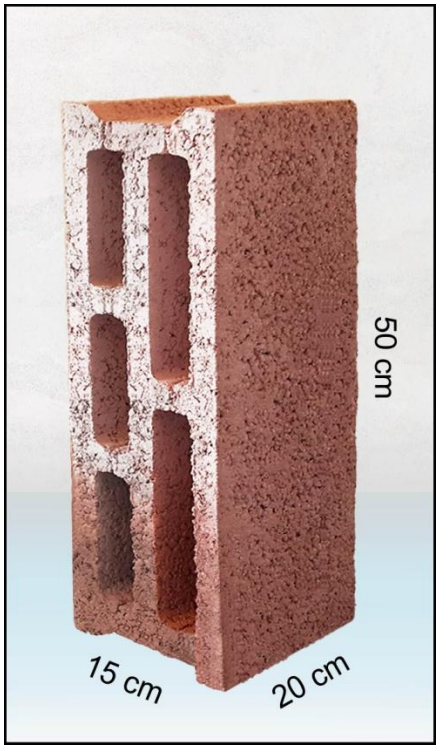
* Speed and ease of construction to shorten the duration of project execution resulting in savings on labor and financing costs.
* Savings of up to 60% on the cost of transport by the consumer to the destination project. Transport is a key cost factor.
* Reduction in reinforcing and lower foundation cost and allowing for an increase in live load capacity.

ThermoLite block is an ultra light concrete masonry product. It can weigh as little as 1/4 the weight of ordinary concrete blocks. It weighs as little as 11.25 kgs/block in 15*50*20 cm size.

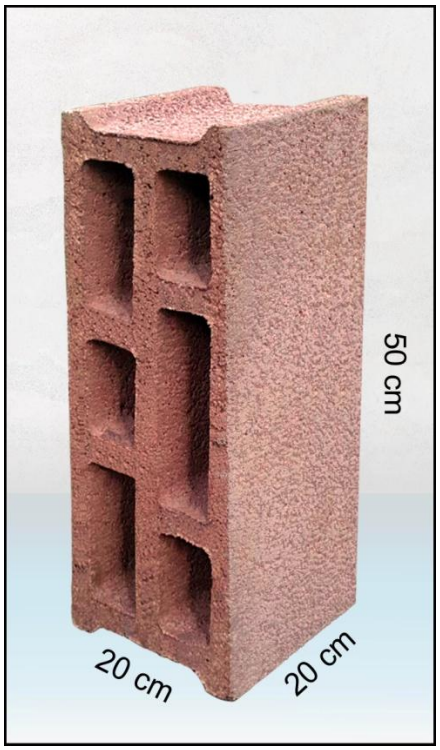
When compared to its closest competition, ThermoLite proves to be the most ideal building block that makes for the perfect choice in the construction industry in Iraq. It is the strongest insulator against temperature, humidity and sound, furthermore, it is the lightest in weight and the least expensive in each of the costs related to:

a) Purchase price,
b) Project execution time affecting labor and financing costs, and,
c) Material consumption.

ThermoLite: L-1550		
Size	**Width x length x height**	**15x50x20**
Thermal conductivity	w/mk	0.1
Dry weight	kgs	11.25
Compressive strength	MPa	3.5
Water absorption	% of weight	10
Consumption rate	Block/m²	10
Sound absorption	db	46 to 53
Fire rating	---	A1

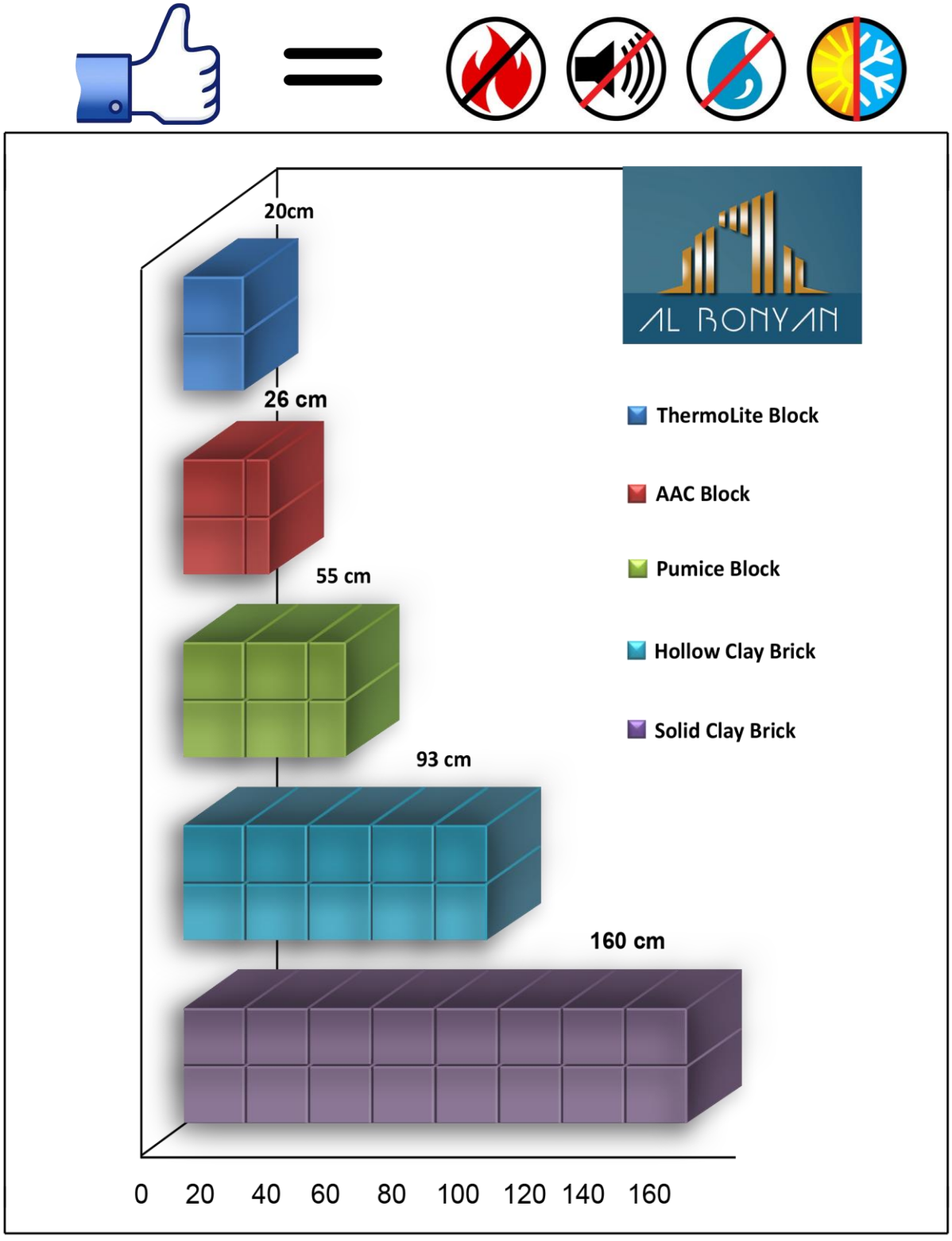


ThermoLite: 2050		
Size	**Width x length x height**	**20x50x20**
Thermal conductivity	w/mk	0.1
Dry weight	kgs	13
Compressive strength	MPa	3.5
Water absorption	% of weight	10
Consumption rate	Block/m²	10
Sound absorption	db	46 to 53
Fire rating	---	A1



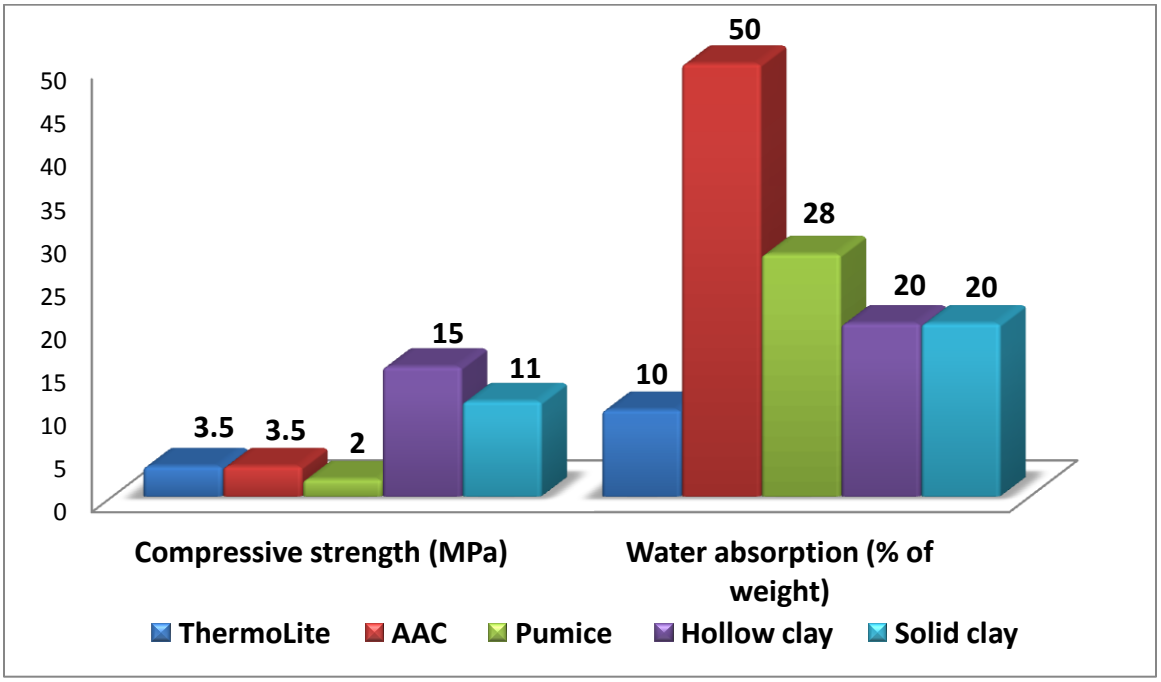
AL BONYAN

General Comparisons					
Subject of Comparison	Hollow clay Brick	Solid clay Brick	Pumice Block	AAC Block	ThermoLite
	11.5x24x7.5 cm	10x30x5 cm	20x40x20 cm	20x60x20 cm	**20x50x20 cm**
	2.5 kg	4 kg	9 kg	15.5 kg	**13 kg**
Wall thickness of Equivalent thermal insulation (cm)	93 cm Non thermal	160cm Non thermal	55 cm Partial	26 cm Fair	20 cm Excellent
Maximum water absorbency (% of weight)	20% Fair	20% Fair	28% Retains water & rots	45% absorption & deterioration	10% Semi Insulator
Compressive strength (MPa)	11 Load bearing	15 Load bearing	2 Fragile	2 to 3.5 Weak to good	3.5
Block weight for wall of 1m² x 20cm thick (kgs/m²)	277 Heavy	532 Very Heavy	130	130	130
Block quantity for wall of 1m² x 20cm thick (pcs/m²)	111 Costly execution	133 Costly execution	12.5	8.34	10
Block unit Cost (dinar)	180	200	1500	2500	**1,700 to 1,850**
Block cost for wall of 1m² x 20cm thick (pcs/m²)	19,980	26,600	18750	20,850	**17,000 to 18,500**

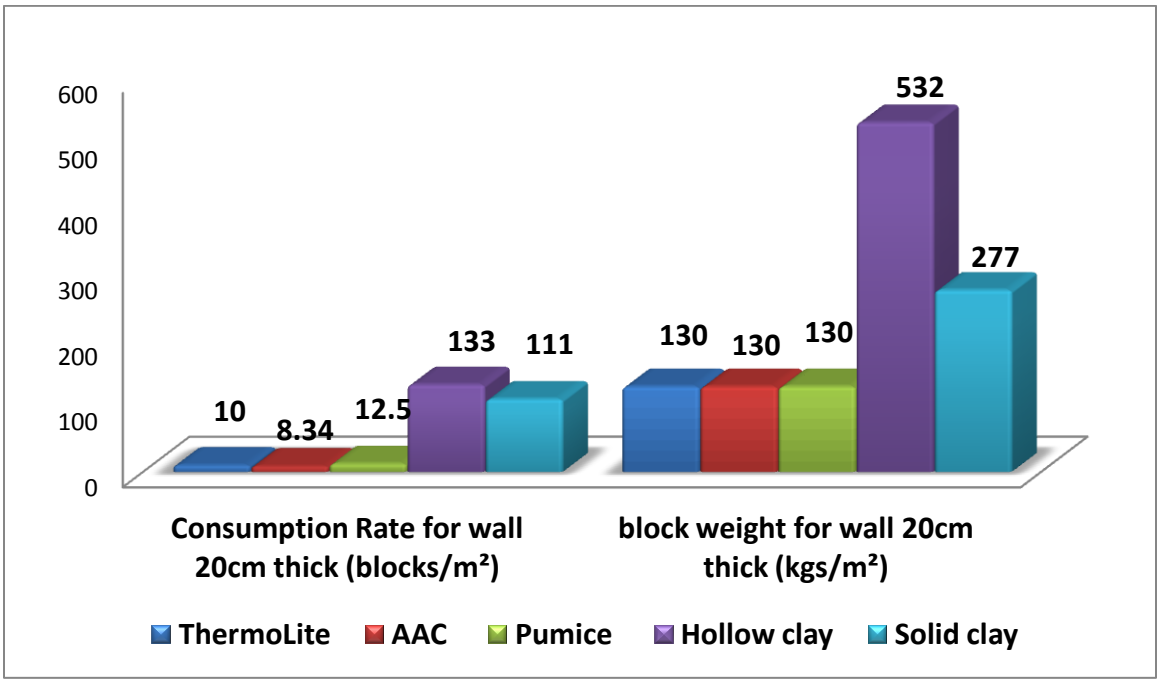


Wall Thickness Of Equivalent Thermal Insulation (cm)

Compressive Strength & Water Absorption Comparisons



Consumption rate and weight of 1 m² wall (20cm thick)



AL BONYAN

Properties of ThermoLite vs. AAC block		
Properties	**AAC**	**ThermoLite**
Thermal conductivity	**Excellent** Thermal Conductivity of 0.16 w/km, it is a good thermal insulator.	**Excellent** Thermal Conductivity of 0.09 w/km it is a better Thermal insulator than AAC block by up to 30%.
Water Absorption	**Poor....** At the spongy absorption rate of more than 45% of its weight, it is a failure. Gypsum being its primary ingredient, it (rapidly) deteriorates with water.	**Excellent...** At 10% of its weight, it is the least absorbent of all blocks. Its non absorbent/water floating expanded clay aggregates are porous ceramic products with closed cells and with a densely sintered, firm external skin manufactured in rotary kilns.
Weight	**Light weight** 15 kgs 20x60x20 cm block	**Light weight** 13 kgs: 20x50x20 11.25 kgs: 15x50x20 cm
Compressive strength	2-5 MPa	3.5-4.5 MPa
Rigidity	**Fragile** High wastage during transport and construction. Performs poorly when exposed to the weather for extended periods	**Rigid** It can withstand sudden impacts during transport and construction. It is inorganic and not susceptible to dry-rot, and wet-rot.
Surface treatment	**Impractical and non economical..** Its smooth surface, high water absorption rate, and fragile properties are factors to cause costly extra labor and special material to render and plaster and treat against water absorption.	**Excellent** Speed/ease of construction to save on labor and financing costs. Ideal for interior/exterior walls, and suitable for cutting/nailing/ridge extending to make route for wire, pipe, etc... Its low water absorption and large surface pores make it suitable for rendering and plastering by both manual and mechanical means.
Sound Absorption	37 to 42 db	46 to 53 db
Insect/Critter Penetration	**Poor**	**Rigid & non susceptible**
Fire resistance	**Grade A1**	**Grade A1**

AL BONYAN

Properties of ThermoLite vs. Pumice block		
Properties	**Pumice**	**ThermoLite**
Thermal conductivity	**Partial Insulation** Thermal Conductivity of up to 0.25 w/km.	**Excellent.** At 20 cm thick, it insulates the equivalent of a 55cm thick Pumice block wall. Cool summers and warm winters. Thermal Conductivity of 0.09 w/km
Water Absorption	**Poor..** its porous volcanic grains are of open & uncovered cells. It absorbs water up to 28% of its weight & retains it for extended periods causing rot. It is simply difficult to dry	**Excellent...** At 10% of its weight, it is the least absorbent of all blocks. Its non absorbent/water floating expanded clay aggregates are porous ceramic products with closed cells and with a densely sintered, firm external skin manufactured in rotary kilns.
Weight	**Light weight**	**Light weight** 13 kgs: 20x50x20 cm 11.25 kgs: 15x50x20 cm
Compressive strength	**Poor..** 2 MPa	3.5-4.5 MPa
Rigidity	**Fragile** Transport & construction Wastage	**Rigid** It can withstand sudden impacts during transport and construction.
Surface Treatment & Construction Cost	**Fair** Easy to plaster, but, need heavy treatment against water absorption.	**Excellent** Ease/Speed of building & Plastering with Conventional mortar without treatment to save on labor, material and financing costs.
Sound Absorption	45 to 58 db	46 to 53 db
Insect/Critter Penetration	**Rigid & non susceptible**	**Rigid & non susceptible**
Fire resistance	**Grade A1**	**Grade A1**

AL BONYAN

Properties of ThermoLite vs. Clay brick		
Properties	**Clay Brick**	**ThermoLite**
Thermal conductivity	**Poor..** Thermal Conductivity of up to 0.72 w/km, it is **not** a thermal insulator.	**Excellent.** At 20 cm thick, it insulates the equivalent of a 93cm to 160 cm thick clay brick wall. Cool summers and warm winters. Thermal Conductivity of 0.09 w/km
Water Absorption	**Fair..** At 20% of its weight, it borderlines the acceptable absorption level.	**Excellent...** At 10% of its weight, it is the least absorbent of all blocks. Its non absorbent/water floating expanded clay aggregates are porous ceramic products with closed cells and with a densely sintered, firm external skin manufactured in rotary kilns.
Weight	**Heavy...** 4 times as heavy. 4 kgs: 10x30x5cm	**Light weight** 13 kgs: 20x50x20 cm 11.25 kgs: 15x50x20 cm
Compressive strength	**Load Bearing** 11 MPa	3.5-4.5 MPa
Rigidity	**Very Rigid..**	**Rigid**
Surface Treatment & Construction Cost	**Impractical and non economical..** Its small size brick, rigid & smooth surface properties are cause for extended construction time & labor and mortar material due to difficulty in plastering, cutting, nailing, ridge extending to make proper route for wire, pipe, etc...	**Excellent** Speed/ease of construction to save on labor and financing costs. Ideal for interior/exterior walls, and suitable for cutting/nailing/ridge extending to make route for wire, pipe, etc... Its low water absorption and large surface pores make it suitable for rendering and plastering by both manual and mechanical means.
Sound Absorption	45 db	46 to 53 db
Insect/Critter Penetration	**Rigid & non susceptible**	**Rigid & non susceptible**
Fire resistance	**Grade A1**	**Grade A1**

ThermoLite's Packing, Transport, Consumption rate per Cube				
Measurements (W x L x H)	**Cubes per Trailer load**	**Blocks per Cube**	**Cube's capacity to build (m^2)**	**Block Quantity per trailer load (blocks)**
15x50x20	38	80	8	3,040
20x50x20	40	60	6	2,400

AL BONYAN

University of Basrah
College of Engineering
Cons. Materials Lab.

No: 7/57/532
Date : 11/4/2016

To: ***AL BONYAN COMPANY.***

Sub. / RESULTS OF NON-LOAD BEARING CONCRETE MASONARY UNITS (400*200*200 mm)

Information of Test Ref.

Reference No. & Date	Site Location & Project Detail	Implementing Company
5 @ 4/4/2016	----------	------

RESULTS oF DIMENSIONS

Test Result of Average's Dimensions (mm)				Permissible Limits of Iraqi Standard (1129/1990) of Average (mm)			
Length	Width	Height	Thickness of Crust	Length	Width	Height	Thickness of Crust
500	150	200	25	400±3	200±3	200±3	Not Less Than 13

RESULTS oF COMPRESSIVE STRENGTH

Test Result				Permissible Limits of Iraqi Standard (1129/1990)	
Compressive Strength(Mpa)				Compressive Strength (Mpa) Calculated Depending on Near Area	
Indivisual Results			Average	Indivisual Result	Average
10.3	10.5	9.2	10.0	Not Less Than 3.5	Not Less Than 4.0

RESULTS oF ABSORPTION

Test Result				Permissible Limits of Iraqi Standard (1129/1990)	
Water Absorption (%)				Water Absorption (%)	
Indivisual Results			Average	Indivisual Result	Average
8.6	9.4	10.3	9.4	Not More Than 22	Not More Than 18

Notes:
-The results represents the tested samples only .
- The tests were carried out according to Indicative Reference Guide No: (32/1989) .
-The results were compared according to Iraqi Standard No: (1129/1990).
-The sample was brought by: Mr. Zaid Khalaf Fares . @ 4/4/2016 .
-The test result is given to: : Mr. Zaid Khalaf Fares .

Asra'a H
Tested By
Eng. Asra'a H. Muhi

Check By
Suaad R. Abood

Materials Lab. Supervisor
Dr. Aqeel H. Chkheiwer

A copy of it to:
-Public laboratory tests.

AL BONYAN

EMAR ENGINEERING LABS **مختبـــر الإعمـــــار الإنشائـــــي**

معتمد من قبل وزارة التخطيط / الجهاز المركزي للتقييس والسيطرة النوعية / قسم اعتماد المختبرات
Accredited according to ISO/IEC 17025:2005 and the requirement of Iraqi Accreditation System (IQAS)
No. of Accreditation TL 005 رقم الإعتماد

No. : C/777
Date: 6/4/2016

To :AL BONYAN Co .

Dear Sirs,

Subject / Non Load-Bearing Concrete Masonry Units(Thermalite Block)
Reference is made to your letter No. 25 dated 4/4/2016, please find below the test result.

Project	AL BONYAN Co.								
Specimen NO.	Dimensions (mm)			Compressive Strength N/mm^2	Average N/mm^2	Water Absorption (%) (90 minutes)	Average (%)	Total weight (kg)	Gross Dry Density (Kg/m^3)	Net Dry Density (Kg/m^3)
	Length	Width	Height							
1	500	150	200	3.2	3.5	6.9	6.7	11.17	744.7	1205.6
2	500	150	200	3.9		6.7		11.16	744.0	1204.5
3	500	150	200	3.6		6.5		11.26	750.7	1215.3

Notes:
- The sample was delivered on 4/4/2016 by Mr. Zaid Khalaf the representative of the company.
- The test has been done according to BS EN 771-4.
- The results represented the tested sample only.

Kind regards,

AHMED SWADI
Director

6.4

Basra – Iraq
email: emarlab667@gmail.com
البصرة- مجاور نقابة المهندسين- تقاطع الطويسة
mobile: 964(0) 772 250 7179

AL BONYAN

Basra Investment Commission Industrial Zone
Khor El Zubair, Umm Qasr highway,
Basra, Iraq.

Phone: +964- 771 310 0025
Email: info@bonyanblock.com

www.bonyanblock.com