

# Kuikwall

## INTRODUCTION

Kuikwall is an eco-friendly lightweight cement based building material with good heat insulation, compressive strength, sound proofing qualities and low water absorption. It was first used commercially some 60 years ago in Sweden.

Today it is widely used for its lightweight, fast-built and eco-friendly properties. It is also a component for IBS (Industrialised Building System) projects.




Vista Bay Penang – a showcase of kuikwall



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Is Going Green Expensive? L

	Insulated Concrete Blocks	Cement Bricks
Material	2.70	2.10
Lay	0.60	0.70
Mortar	0.15	0.40
Plaster	0.90	1.30
Internal Plaster	1.10	1.40
Exmet	0.05	0.15
<b>Total Cost</b>	<b>5.50</b>	<b>6.05</b>



Home Finder May 2011



AWARDS

## CERTIFICATION & AWARDS

IBS/CIDB AWARD CERTIFICATION

SIRIM 4 HOUR LIGHT WEIGHT BLOCK FIRE RATING & SIRIM CERTIFICATION FOR SUPRACOAT THIN BED ADHESIVE, SUPERWALL PLASTER & SUPRACOAT SKIM COATING.

BOMBA CERTIFICATION FOR LIGHT WEIGHT BLOCKS  
 CIDB – IBS STATUS & CERTIFICATION FOR LIGHT

DOSH CERTIFICATION FOR LIGHT WEIGHT BLOCKS



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*PROCRETE is the name created for geotechnical applications*





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**INNOVATIVE  
PRODUCT  
AWARD**

INVENTION • INNOVATION • INDUSTRIAL DESIGN • TECHNOLOGY

MALAYSIA



**ITEX '06** Invention • Innovation  
Industrial Design • Technology

MALAYSIA



ITEX '06

Organised By:  **MINDS**  
Malaysian Invention And Design Society (MINDS)

Managed By:  **CIS**  
C.I.S NETWORK SDN BHD

Endorsed By:  **MINISTRY OF SCIENCE, TECHNOLOGY & INNOVATION**

 **MINISTRY OF HIGHER EDUCATION**

 **MATEJAP**  
Malaysian External Trade Development Corporation



# Kuikwall

## 1.0 THE MATERIAL

Manufactured with cement, fine sand, water, chemicals and a special foam, it is a strong, lightweight concrete without coarse aggregate. containing millions of independently distributed and consistently sized air bubbles or cells.

The density is determined by the amount of foaming agent & chemicals added to the basic cement mortar. Typically there are up to 2 million air bubbles per cubic cm of light weight concrete.

## 1.1 MANUFACTURING METHOD

Procrete is formed by entrapping small bubbles of air in a Portland cement paste or mortar by special equipment where a stiff, preformed foam is added to a mixer.

With careful mix design and material batching, different densities and types of **Procrete** can be produced which is light weight, self-flowing, easily pumped and needing no compaction.



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## 1.0 Advantages

It is possible to pump **Procrete** into formwork for in-situ casting especially for housing and apartment or hotel projects where the work is repetitive.

It is up to 10 times faster than conventional brickwork. The reduction of weight, also saves foundation and super structures cost. All these beneficial qualities and savings in time, labour, carbon footprint, air conditioning & other costs has made it a Green & Eco-Friendly, Government selected building material for modern day **Industrial Building System** worldwide.

## PRODUCT DATA

### SIZE

100 x 200 x 460 mm ( 0.1 m<sup>2</sup> per block)

Standard International Architectural & Malaysian IBS( Industrial Building System) Dimensions ) dimensions . Each SUPRA BLOCK 1000 is equivalent to 8-9 cement / clay bricks in size . Only 10 G BLOCKS is used per 1 m<sup>2</sup> of wall , compared to 65 to 73 pieces of common bricks to be installed per m<sup>2</sup> .

### WEIGHT & DENSITY

8 kg weight per block (1000 kg per m<sup>3</sup> density) .

Standard G BLOCK 1000 is 45 – 50% lighter than 8 bricks weighting up to 30 kg . Different density of 800 , 900 , 1000 kg/m<sup>3</sup> up to 1400 kg per m<sup>3</sup>( Singapore Standard ) can be produced .

### FIRE RATING

SIRIM 4 hr Rating . BOMBA KL APPROVED

Twice Fire Rating requirement of 2 hrs .

### THERMAL INSULATION

0.23 w/mK (4 to 6 times better heat insulation than concrete & brickwork.

**COMPRESSIVE STRENGTH:** 3 N/mm<sup>2</sup> for 1000 density , depending on cement content & mix design

SIRIM TESTS FOR 1200 DENSITY IS 3.9 N/mm. Compressive strength is related to Density & mix design . Up to 20 N/mm<sup>2</sup> can be achieved with special mix designs .



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## WATER PERMEABILITY / ABSORPTION

$10^{-10}$  m/s (4 to 6 times superior to concrete , cement & clay bricks)

## Air Bubble Content / Discrete void :

40- 45 % of entrapped

Shrinkage: 0.1 % (After Seven days )

## Certifications and awards:

IBS CERTIFICATION FOR LIGHTWEIGHT BLOCKS 2009

SIRIM FIRE RATED 4 HRS

SIRIM FIRE RATED 4 HRS FOR SUPRACOAT PLASTERS & ADHESIVES

SIRIM COMPRESIVE STRENGTH CERTIFICATION

BOMBA KL CERTIFICATION

DEPARTMENT OF OCCUPATIONAL SAFETY & HEALTH CERTIFICATION

IPTA Gold Medal 2005

Innovative Product Award, ITEX 2006

UTHM INDUSTRIAL COLLABORATION AWARD 2007

## Sustainability Index

Enhanced thermal insulation(0.23 w/mK) compared to concrete and conventional brickwork (0.9-1.4 w/mK) .10 times faster wall erection reduced energy consumption for sustainable construction. Carbon Credit Green Material.

## Procrete - Insitu

Maximum height per cast: 1.5 m

Construction joint interval: 6 m



### Breaking Point Test :

1750 kg cement (35 bags )  
loaded on Door Lintel made  
from Supracrete 1200 density.

## HOW STRONG IS KUIK WALL ?

> 200 KG !





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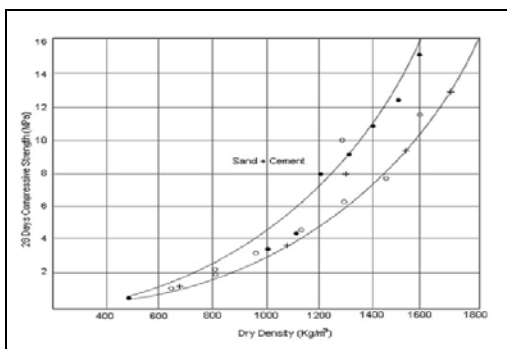
## 2.0 PROPERTIES

### 2.1 DENSITY

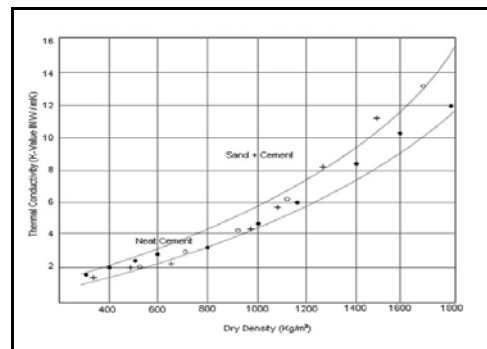
The density of G BLOCKs foam concrete falls within the range of 600 - 1400 kg/m<sup>3</sup>. Densities of 600 kg/m<sup>3</sup> or less are used where thermal insulation rather than strength is required.

### 2.2 COMPRESSIVE STRENGTH

**PROCRETE** with densities from 300 to 1600 kg/m<sup>3</sup> can be produced at strength in the range 0.5 to 20 N/mm<sup>2</sup>. Compressive strength of above 20 N/mm<sup>2</sup> can be achieved with special mix designs .



*Compressive Strength Chart*



*Thermal Conductivity*





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## 2.3 THERMAL CONDUCTIVITY

The excellent insulating property of SUPRA BLOCKS is due to the great number of independently micro air bubbles forming the multi-cellular structure.

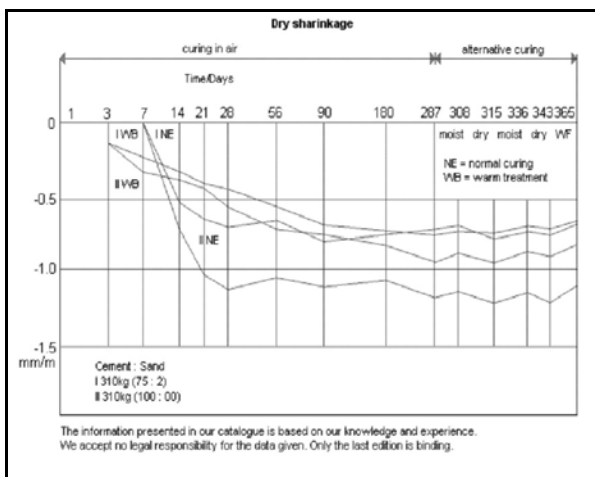
A 50 mm layer of foam concrete, having a density of 400kg/m<sup>3</sup> has approximately the same heat insulation value as a 25 mm thickness of cork. The amplitude-ratio and phase displacement of a 15cm thick foam concrete wall with a density of 1100kg/m<sup>3</sup> has been found in studies to resist the heat or cold air outside of a building to penetrate the inside wall (between 10 to 12 hours) thus proving its energy saving properties .

## 2.4 WEATHERING RESISTANCE

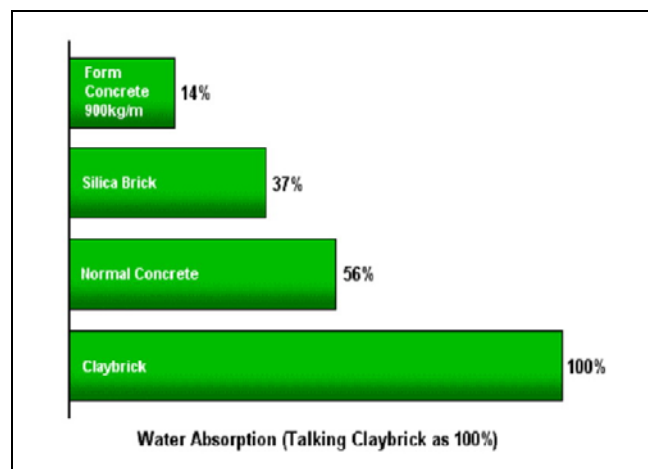
Outdoor exposure and accelerated weathering tests have shown that SUPRA BLOCKS foam concrete offers good resistance to wide extremes of weather. It is much used in cold countries for its freeze thaw properties.

## 2.5 SOUND ABSORPTION

The co-efficient of sound absorption of un-plastered foam concrete wall of 800 kg/m<sup>3</sup> density is approximately 0.35 which is similar to that of acoustic plaster. SUPRA BLOCKS foam concrete is highly suitable for party walls, office partitions and floor screeds.



Dry Shrinkage Chart



Water Absorption Chart



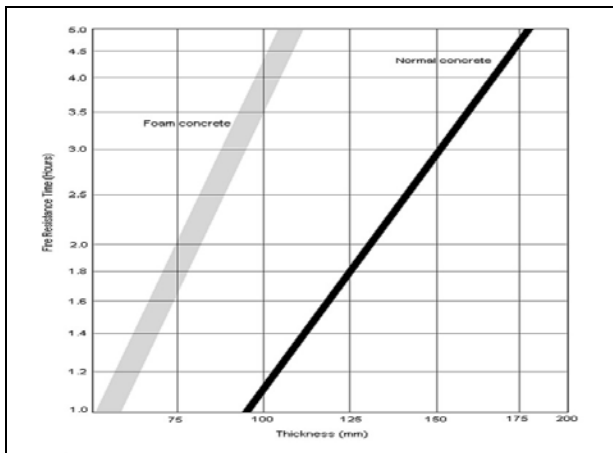
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## 2.6 WATER ABSORPTION

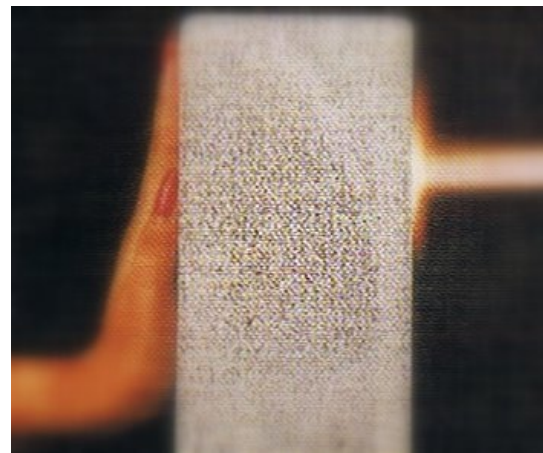
Due to the cellular structure of foam concrete where millions of air cells prevent water from passing through, water absorption is rated the lowest for light weight blocks.

## 2.7 FIRE RESISTANCE

G BLOCK achieved 4 hr Fire Rating from SIRIM .  
This exceeds the 2 hr Government requirements .



Fire Resistance



Flame Test

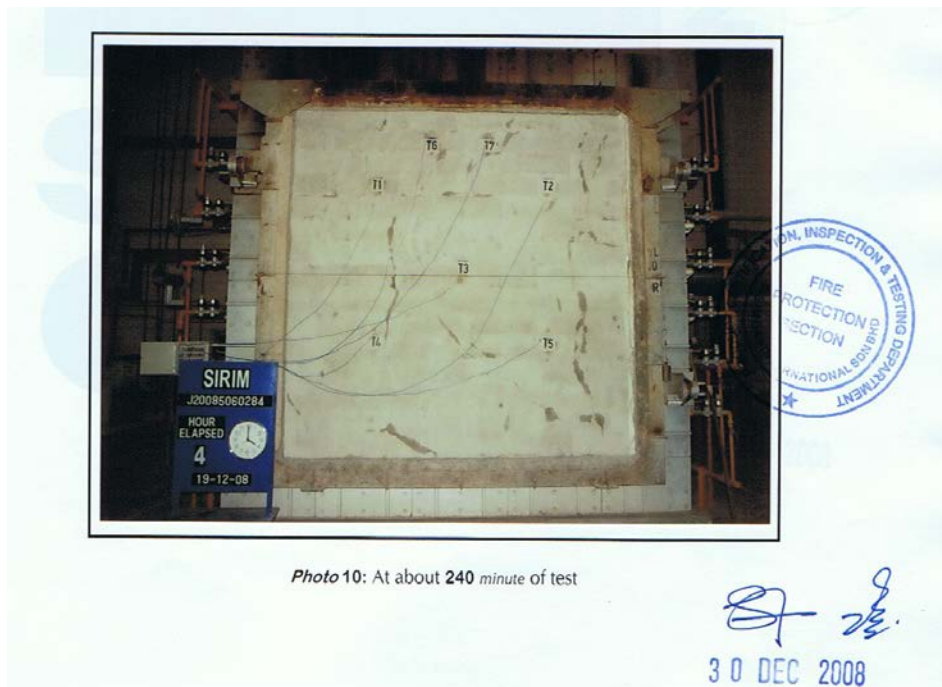


Photo 10: At about 240 minute of test

30 DEC 2008



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## 3.0 ADVANTAGES

Can be produced in large volume very quickly in factories as well as on building sites

- IBS ( Industrial Building System ) & CIBD Certified
- A lot of project savings
- Green Energy Technology – cooler buildings . Lower carbon footprint
- Faster Construction
- Better Fire resistance than cement & clay brick .
- Provides better insulation against heat/cold and sound
- Saves on piling and superstructure costs
- Good for walls on existing structure to save weight
- Saves plastering materials & labor
- Less project house keeping & waste removal
- Reduces transport costs and less handling.
- Can be manufactured on site for a lot of cost savings

## 4.0 USES OF LIGHT WEIGHT CONCRETE

- In lightweight concrete insulating bricks, blocks, roof tiles etc
- In building panels , partition walls , insulation cavity walls of various dimensions either pre-cast or poured on site (residential, industrial, commercial)
- In ceiling panels
- In sound proofing applications
- In pre-cast exterior wall facades
- To reduce humidity and dampness and to stabilize temperatures
- In sub-surface for sports arenas eg tennis courts
- In infill sections between beams of suspended floors
- In floor screed with rigid or plastic floor covering





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## 5.0 APPLICATIONS

Density 300 to 600 kg/M3

- Thermal insulation for flat roofing with required gradient
- Floor sub-surfaces
- Block infill for sub-floor slabs
- Cavity walls filling
- General thermal and acoustic insulation
- Heat insulating roof slabs

Density 600 to 900 kg/M3

- Internal partition wall blocks and panels
- Roofing slabs
- Floor sub-surface for animal stables, pig sties, and poultry farms
- Wall, roof and floor sub-surface of large cool rooms
- Façade panels, architectural cornices & molding.
- Trench reinstatement

Density 900 to 1200 kg/M3

- External & Internal wall blocks and panels (non-structural)
- General sound proofing in industrial areas

Density 1200 to 1600 kg/M3 ingredient

- Medium weight block and slabs
- Large reinforced slabs and panels
- Walls, either precast or poured in situ

- A. Use THIN BED ADHESIVE by mixing with water, cement mixed with Tile Adhesive to give best results
- B. Lay a layer of the above mortar to get first course level and plumb. Accurately lay and tap into place with a rubber mallet. Ensure that the block is level, straight and in position.
- C. All loose particles and dust should be brushed from the vertical surface of the block before applying SP-TBA.
- D. Position the next block vertically in position over the mortar. Place the block in position and gently tap the block end horizontally (1) with a rubber mallet to fully close the vertical joint.
- E. Tap the block vertically (2) into the base mortar and level with the first block
- F. Repeat until first course is complete.



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## 6.0 METHOD STATEMENT

- A. Overlap the block joints a minimum of 100mm over the joints in the previous course. Normal practice is to overlap by the thickness of the intersecting wall.
- B. Apply the block mortar to the horizontal surface using a trowel .
- C. Position the first block in the second course and gently tap it accurately into place with a rubber mallet. Joints should be 4-10 mm thick.
- D. Apply the block mortar to side of the first block. Position the next block in position over the first block and tap into correct position.
- E. Tap the top block until level with the previous block laid.
- F. Repeat for subsequent blocks.
- G. Excess block mortar should be cleaned off the block face at the end of each course.
- H. Gaps in the block work must be patched using SP –TBA and the surface made good for Skim Coating or Plastering .

For the light weight block wall erected.

- i. Horizontal tie down rods at intervals of ~ 400mm and
- ii. Vertical tie down rods at intervals of ~ 600mm.
- iii. At places where the blocks meet the RC columns, wall or beams a layer of ex-mat (steel netting) or alkaline resistance netting should be placed overlapping the block and RC surface ( a minimum of 25 mm each side) to prevent shrinkage crack.



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