

### Research on using foam glass to produce light weight insulation materials – Outdoor test stand in Ho Chi Minh city

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## **Introduction**

- **Foam glass** or **cellular glass** is an insulation material, flame retardant, high chemical resistance and thermal stability;
- **Application of foam glass:**
  - Civil constructions: insulating block of walls or roofs
  - Industries: insulation of cold systems; chemical heat exchanging towers; ground heat exchanger;
- **Glass** is widely used in life as well as in industry which results in a large amount of glass waste after consumption.
- Therefore, **Research on using foam glass to produce light weight insulation materials** is necessary. This task will solve two problems:
  - Manufacturing of special insulations;
  - Solving the problem of discharge glass after consumption

### Research objectives

- **Manufacture foam glass gravel from glass waste**
- **Fabricate high-performance lightweight insulation materials from fabricated foam glass gravel**
- **Develop national standard for fabricated products**
- **Pilot production of fabricated product**



### ➤ Raw Materials

+Foam glass: Bulk density 250 kg/m<sup>3</sup>

+ Natural sand from Song Lo river

Density	<i>g/cm<sup>3</sup></i>	2,65
Bulk density	<i>kg/m<sup>3</sup></i>	1482
Modul		2.55



+ Blended PCB40 cement

Receiving foam glass from IBP

Chemical composition (%)							Mineral content		
Al <sub>2</sub> O <sub>3</sub>	CaO	MgO	K <sub>2</sub> O	Na <sub>2</sub> O	SO <sub>3</sub>	LOI	C <sub>3</sub> S	C <sub>2</sub> S	C <sub>3</sub> A
6,42	64,1	1,31	2,5	1,56	1,02	1,39	59,02	25,00	12,17

+ **Additives:** Polycacboxylate sika : visocrete 3000 - 20M

### ➤ Manufacturing process



Foam glass gravel was crushed size of less than 5cm

Light brick was made process of shell compaction

Final products

### ➤ The component of raw materials for 1m<sup>3</sup>

Cement (kg)	foam glass (kg)	Sand (kg)	Water (kg)	Additive (liter)
74	781	73	70	1.2

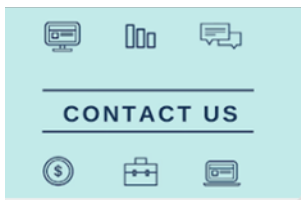
➤ **Properties of fabricated light weight bricks**

Properties	Unit	Result
Dimension	mm	220x110x75 mm
Density	Kg/m <sup>3</sup>	500
Compress strength	MPa	12 (28 days)
water absorption	%	≤ 0,10
Expansion	mm/m	≤0,35
Thermal conductivity (HMF method)	w/(mk)	0,25

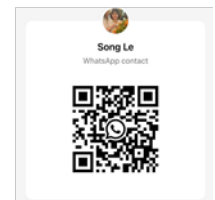


### ➤ **Future research**

- **Production technology for foam glass gravel**
- **Characterization of fabricated foam glass gravel**
- **Research on the application of fabricated foam glass gravel in the production of dry mortar**
- **Research on the application of fabricated foam glass gravel in the production of light weight insulating mortar**



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- Optimization of Fly Ash-Based Aggregate Production
- Characterization of Lightweight Aggregates
- Research on the application of lightweight aggregates in the production of dry mortar and light weight thermal insulating concrete for construction.
- Using fly ash-based aggregate to produce lightweight and highly insulating materials