

EOI

Name of the Technology:

Process technology for development of light weight glass foam bricks.

Technology for: Thermal and sound insulation and construction application

Description of Technology:

The proposed technology relates to a process of developing glass foam utilizing waste glasses maximum upto 99%. This technology reveals a process to develop low density glass foam utilizing 98-99 % of waste glasses with foaming agent within 1-2 wt%. Further, optimizing composition, foaming agents, particle size and process parameter like sintering temperature, sintering schedule uniform foam distribution can be achieved. The process involves waste glass collection, crushing and forming glass powder and mixing with foaming agent and followed by sintering. The process parameters also need to be optimized for different shape and size of foam. Moreover, optimization of foaming agent need to minimize overlapping of gas bubble reducing pore diameter and thereby helps in formation of closed porosity. Therefore, smaller pore size and closed porosity influence higher mechanical properties like compressive strength in glass foam.

Salient features of glass foam bricks:

- Lightweight glass foam (Bulk density: 0.25-0.5 g/cc; Porosity: 80-90 %)
- Low thermally conductive material (0.09-0.23 W/mK)
- Tuneable compressive strength (2-7 MPa)
- Low water absorption (< 5 wt%)
- Acoustic Insulation
- Temperature Stability: up to 700°C
- U-value (500x500 mm panel): 0.87 W/m².K (Wall thickness 110 mm, Temp: 35 to 10°C)

Abstract:

Waste generated in form of glass in present day is significantly high. This comprises various sorts of glass wastes originating from lighting accessories, vehicle windshield, household waste, E-waste devices, waste from building and architecture, and others. Although some parts of such glass are recycled, use of such glasses in original purposes is difficult due to composition inhomogeneity and contamination. Therefore, significant portion of waste glasses are restricted to landfill only.

In this connection, lightweight foam glass preparation utilizing various glass wastes can be considered one of the most environmentally friendly, durable and efficient thermal insulators. Some of the desirable properties of glass foam includes high material strength, lightweight, low thermal conductivity, thermal insulation mitigating frost damage, capillary breaking layer, incombustible and chemical resistant, minimal leaching, does not rot and keeps in shape, electrical and sound insulating. These properties have enabled its use in a range of applications such as insulation floor slab for buildings, construction of roof gardens, backfill around swimming pools and pipelines, low density fill above tunnels and structures and construction of sports fields. Foam glass panels are used worldwide for building cladding and pipe insulation for chemical manufacturers and oil refineries.

Present study reveals a process to develop glass foam bricks with compressive strength 3-5 MPa; Thermal conductivity 0.1-0.2 W/m.K; density 0.3 to 0.6 g/cc, porosity 80-90 %. This foam is prepared utilizing 98-99 % waste glasses obtained from various sources. Dimension of brick 230*110*70 (mm).

TRL: 6/7 (Demonstrated in industry)