

## Reinforced Brick Panel Roof

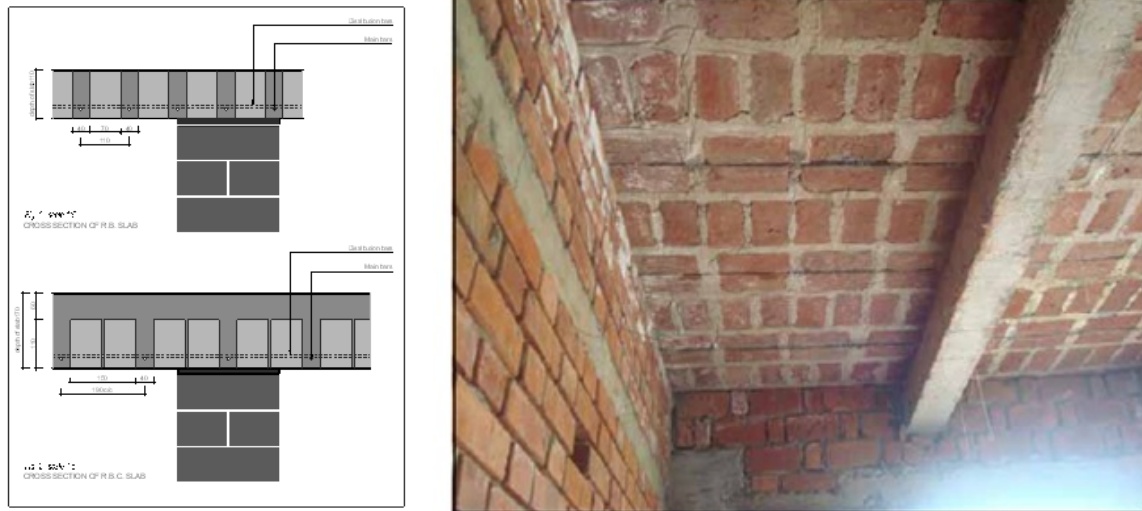


Figure 01: Reinforced Brick panel roof details

### Overview

Reinforced brick panels consist of bricks, concrete and reinforcement. In all essential features, RB slabs are the same as reinforced concrete except that brick work in cement mortar is substituted for cement concrete. Concrete is used in the zone of maximum compressive stresses thus bricks of lower compressive strength can be used. The panel is made with bricks reinforced with two MS bars of 6mm dia. and joists filled with either 1:3 cement, coarse sand mortar or M20 grade concrete. These prefabricated brick panels are placed on partially precast RC joists. The length of the brick panel shall not exceed 1.1m for bricks with strength lower than 40 N/mm<sup>2</sup>. Each panel of 530x900mm requires 16 bricks and 530x1150mm require 18 bricks of conventional type.

Reinforced brick slabs are easier to construct than reinforced concrete slabs because they do not require the same amount of close and skilled supervision. As it has been noted that RB slabs behave structurally similar to RCC, therefore it is recommended that they be designed with the same method.

CATEGORY	ATTRIBUTE	INPUT	SOURCE
Resource Efficiency	Embodied energy and CO <sub>2</sub> emission	EE: 510.5 MJ/m <sup>2</sup> CO <sub>2</sub> Emission: 42 kgCO <sub>2</sub> /m <sup>2</sup>	Source: <a href="#">Kishore, Naveen &amp; S. Chouhan, J. (2014). Embodied Energy Assessment and Comparisons for a Residential Building Using Conventional and Alternative Materials in Indian Context. Journal of The Institution of Engineers (India)</a> *Values for 100mm thickness in M20 CC
	Critical resource use	50.66	Source: Calculated critical use index (0-100)
	Current recycled content	Nil	
	Future reusability	Low	Source: <a href="#">SEP India Partially precast brick panel roof slab technology profile</a>

	<b>Water use during construction and manufacturing</b>	<i>No data available</i>	
<b>Operational performance</b>	<b>Durability</b>	High if built according to IS 14142 and IS 14143	Source: BMTPC
	<b>Ease and frequency of maintenance</b>	Medium frequency of maintenance	
	<b>Impact on cooling or heating loads</b>	Cooling energy (kWh/m <sup>2</sup> /y) savings under different climatic zones Composite: 0.78 (2%) Warm & humid: 6.16 (14%) Hot & dry: -7.5 (-16%) Temperate: 0.43 (3%) Heating energy savings in cold climate: -0.15 (0%)	Source: Based on simulations. Values in savings from base case: 100mm RCC + 100mm lime concrete roofing.
	<b>Noise transmission</b>	<i>No data available</i>	
	<b>Thermal mass (absorption, storage and release of heat)</b>	125kg per m <sup>2</sup> for panel with 75mm thickness	Source: <a href="#">SEP India Partially precast brick panel roof slab technology profile</a>
	<b>Thermal performance (flow of heat)</b>	U-Value 2.8W/m <sup>2</sup> K for assembly of 75mm solid burnt clay brick with 35mm thick cement mortar on both sides	Source: CARBSE Assembly U-factor calculator; <a href="#">Thermo-Physical-Optical properties database of construction materials, CARBSE</a>
<b>User experience</b>	<b>Familiarity with the material</b>	High	
	<b>Modification ability</b>	Medium	Source: <a href="#">SEP India Partially precast brick panel roof slab technology profile</a>
<b>Economic impact</b>	<b>Construction Cost</b>	INR 750 per m <sup>2</sup> . (25-35% cost reduction compared to concrete slabs).	Source: Calculated value based on "Standards and specifications for cost effective innovative building materials and techniques including rate analysis" (second edition), BMTPC, 2009
	<b>Skill requirement</b>	Medium: Labour requirement for 100m <sup>2</sup> : Skilled: 1.3; Semi-skilled 2; Unskilled 2.8.	Source: Standards and specifications for cost effective innovative building materials and techniques including rate analysis (second edition), BMTPC, 2009
	<b>Supply chain</b>	Can be cast on site. Suitable where bricks are cheaply available.	
	<b>Duration of Construction</b>	<i>No data available</i>	
	<b>Job creation</b>	0.83 man-days/m <sup>2</sup> .	Source: Calculated value.