RCC Filler Slabs

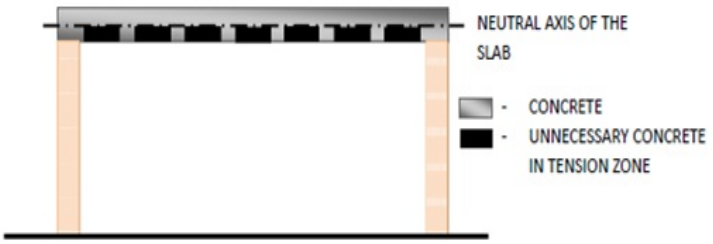

Figure 01: RCC Filler Slabs

Overview

It is a lightweight slab that is constructed by substituting a filler (e.g. brick, mangalore tiles, clay pots etc.) in place of concrete in the tension zone of a conventional RCC slab. Apart from bricks, terracotta pots or tiles could be used in the bottom part of the slab. Filler material replacing concrete in tension zone reduces the overall weight of the slab. It reduces the quantity of steel required by 40% and concrete by 30%. Filler material (with air pockets) acts as insulation layer too. With good workmanship, ceiling can be kept exposed and cost of plaster and paint on underside of the slab be saved. RCC filler slabs are safe for construction for residential buildings up to 2 floors.

CATEGORY	ATTRIBUTE	INPUT	SOURCE
Resource Efficiency	**Embodied energy and CO_2 emission**	EE: 344.8 MJ/m^2; dependent on filler used; CO_2 emission: 34kg/m^2 (for 100mm thick, M15 CC with mangalore tiles as infill)	*Source: Calculations based on data from Strategies for cleaner walling materials in India'- SHAKTI Foundation; CO_2 Source: Kishore, Naveen & 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)*
	Critical resource use	37.5	*Source: Calculated critical use index (0-100)*
	Current recycled content	Medium: 15%- 30% (filler)	*Source: SEP India, Filler slab technology profile*
	Future reusability	Low	
	Water use during construction and manufacturing	329 Litres/m^2	*Source: Calculated from material specifications*

Operational performance	**Durability**	High if built according to IS: 456-1978, IS: 10440-1983, National Building Code of India 2005	*Source: To study the filler slab as alternative construction technology: Journal of Information, knowledge and research in civil engineering.*
	Ease and frequency of maintenance	Medium	
	Impact on cooling or heating loads	Cooling energy (kWh/m^2/y) savings under different climatic zones Composite: -3.61 (-7%) Warm & humid: -4.59 (-10%) Hot & dry: -11.98 (-26%) Temperate: -2.76 (-18%) Heating energy savings in cold climate: -5.09 (-12%)	*Source: Based on simulations. Values in savings from base case: 100mm RCC + 100mm lime concrete roofing.*
	Noise transmission	*No data available*	
	Thermal mass (absorption, storage and release of heat)	193 kg/m^2	*Source: Calculated based on material specifications*
	Thermal performance (flow of heat)	U-Value – 3.94 W/m^2 (for assembly of 100mm concrete at max thickness , mangalore clay tiles fillers of 62mm effective thickness and 12mm plaster)	Source: *C. Kabre - A new thermal performance index for dwelling roofs in the warm humid tropics. Building and Environment 45(2010) 727-73*
User experience	**Familiarity with the material**	Medium	
	Modification ability	Low	
Economic impact	**Construction cost**	INR 1430/m^2	*Source: Calculated based on CPWD Delhi schedule of rates 2016; Adlakha Associates*
	Skill requirement	Medium (24.5%): construction is on site, and thus requires skilled labor.	*Source: SEP India, Filler slab technology profile*
	Supply chain	High: construction on site. Easily available local material as fillers.	
	Duration of Construction	10m^2/day; 28 days curing time	*Source: Compendium for Green Technologies*
	Job creation	1.12 man-days/m^2	*Source: Calculated based on CPWD Delhi schedule of rates 2016*