AS Unit 1: Our Built Environment

2.1.7: SUPERSTRUCTURES (1 OF 3)

KEY TERMS

Term	Definition
Floor	The lower horizontal surface of any room or space that provides structural support for contents, resistance to the passage of moisture, heat and sound, and a surface finish.
DPM	Damp Proof Membrane. An impervious layer of heavy duty polythene sheeting, or similar, included to prevent ground water ingress.
OSB	Object Strand Board. A strong, general purpose building board formed out of compressed layers of wood strands bound in synthetic resins.
Going	The horizontal distance between consecutive nosings (the front edge of a tread, or step).
Balustrade	A series of posts or solid barrier at the side of a stair that supports the handrail and prevents falling over an open edge.

GROUND FLOOR CONSTRUCTIONS

Solid floors

Often constructed as ground bearing concrete slabs on a DPM lapped / joined to wall DPCs, on a hardcore sub-base compacted to make up levels and including rigid foam insulation boards either above or below the floor slab to suit details.

The floor slab is usually reinforced with anti-crack mesh and may be finished directly with a mechanical 'power float', or with a levelling sand cement screed, reinforced if above slab insulation is used.

GROUND FLOOR CONSTRUCTIONS (cont.)

Suspended insitu concrete floors

As per solid floors, with additional steel reinforcement designed to span between supporting walls / ground beams. Used where depth of hardcore fill would be excessive (normally 600mm maximum for residential buildings).

Suspended timber floors

Timber joists supported at DPC level on load bearing external walls and internal sleeper walls. The joists are laid across the shortest span with insulation between.

Ventilation must be provided to the void via air vents/air bricks within the external walls, and gaps in sleeper walls allowing air to travel through. Underlying ground should be levelled, treated with weedkiller, and finished with 50mm concrete or fine aggregate on a polyethylene membrane laid on 50mm sand blinding.

Beam and block floors

Benefit from off-site manufacture of the reinforced concrete beams, availability of concrete infill blocks, fast assembly and little requirement for specialist labour or equipment. Beam and block flooring can provide good levels of noise reduction and fire resistance.

Insulation is usually positioned on top of the floor and covered with a reinforced screed complete with upstand perimeter insulation at the edge of the screed to prevent thermal bridging. Expanded polystyrene (EPS) blocks can be used for infill, in place of concrete blocks. These provide good thermal performance and are lightweight and easy to work with. The blocks can be designed to lap under the concrete T-beam in order to prevent cold bridging.

The beam and block system can be used for upper floors with specifications for soundproofing and thermal insulation adapted to suit application.

INTERMEDIATE FLOORS

Timber joist

Generally, as per suspended timber ground floors. Joists may be built into walls or supported on steel hangers and will require intermittent herringbone strutting to prevent distortion and to help distribute imposed loads. Double joists can be incorporated as trims for stairwells and to provide additional support for partitions.

Engineered timber joists

Engineered products designed to overcome the span limitations of solid timber. Variations include:

I-joists, comprising laminated top and bottom flanges with plywood or OSB webs providing improved strength to weight ratios without the size limitations of standard timber.

Metal web joists, with timber top and bottom members separated by diagonal steel struts to form an open web joist that can span further than I-joists and allow service installations, including pipework and heat recovery systems, to pass through without need for drilling or notching.

Precast concrete planks

Precast and prestressed reinforced concrete slabs, typically 1200mm wide x 150 / 200 mm deep, used to construct floors in multistorey buildings, usually built in over a levelled insitu concrete bearing course in structural walls or supported on the beams of a structural frame.

The slabs have tubular voids extending their full length and have a good strength to weight ratio. With properly grouted joints between the planks, a precast floor can equal the structural performance of a solid floor, although additional soundproofing may be necessary, which can be provided using a high density reinforced floating screed, laid over a compressible foam membrane.