

KEY TERMS

Term	Definition
Cavity wall	A wall formed with an inner structural skin and an outer skin, or leaf, both in masonry, separated by a cavity.
Portal frames	Typically, a single storey, clear span frame with double, shallow, pitched rafters supported by columns, on base plates on pad foundations.
Skeleton frame	A system of columns and connecting beams that support the internal floors and external walls and carries all loads to the foundations.
Braced frame	Form of skeleton frame where the bracing systems, such as floor slabs and diagonal steel sections, are designed to transfer lateral loads to the main frame.
Timber frame	A skeleton frame constructed from graded timber sections.
Balloon frame	Form of timber frame where the wall studs extend from the foundation to the rafters.
Storey height frame	Also referred to as a platform frame. A form of timber frame where each storey is formed by floor to ceiling panels and a floor deck, which is the platform for the next storey.
Structural Insulated Panels (SIPs)	Prefabricated composite panels with insulation sandwiched between structural facings.

MATERIALS

Brickwork - Solid masonry wall construction in brick, often used as an outer facing in cavity walls or as cladding to structural frames.

Blockwork - Solid masonry construction in concrete block, used for party walls, partitions and as the inner insulating and/or structural element of a cavity wall.

Structural grade timber - Based on measurements of strength and extent of physical defects. C16 and C24 are the most common grades of softwood used in the UK (C stands for conifer). C24 is stronger, more resilient, but more expensive than C16, which is suitable for most timber work.

Structural steel - Hot rolled steel used to form standard sections, such as universal beams and columns, joists, and channels, by passing the heated steel through rollers which press it into the required size and shape.

Precast concrete - Concrete prepared off site in a controlled environment using reusable moulds. Typically used for structural elements, including beams, columns, floors, and staircases.

In situ concrete - Concrete cast on site using formwork, with reinforcement positioned before casting, used for substructures and for structural elements, including beams, columns, and floors.

CAVITY WALL CONSTRUCTION

Traditional form of construction with upper floors and roof structures supported on the load bearing masonry inner skin. The cavity prevents penetrating damp and may be filled/partially filled with insulation. The inner skin is often built using insulating blockwork.

PORTAL FRAMES

A building can be formed using a series of parallel portal frames, typically 6m apart, connected with structural eaves beams. The frames will provide a clear span and consist of paired, shallow, pitched rafters supported by columns, on base plates on pad foundations.

Portal frames are usually fabricated from structural steel, although reinforced pre-cast concrete and laminated timber are also used. They are lightweight structures that can be fabricated off-site and erected on site with columns bolted to a substructure. They will include:

- Haunches or brackets at the joints between the rafters and columns to make them 'rigid', resulting in the bending moment in the rafters being transferred to the columns, and allowing the rafters to be reduced in size relative to the clear span. Similar brackets are used at ridge level to form a joint between the paired rafters.
- Bracing in at least one side bay per elevation to give the row of parallel frames lateral stability.
- A secondary framework of purlins fixed to the rafters and rails fixed to the columns is required to support cladding, such as profiled sheeting or prefabricated composite metal panels.
- Possibly masonry cladding between the columns is often included at low level to give greater resistance to damage and improve security.

Portal frames are often used in the construction of light industrial buildings. They are a simple and rapid form of structure to erect, and create a wide, clear-span, weather-proof enclosure at relatively low cost.

