

Emerging Technologies for Housing & Building Construction



1 R-Panels - Panel Building System using steel mesh, polystyrene core and chipping concrete

Materials Used :- meshes manufactured using high resistance steel bar of dia 2.5 – 5 mm, self-extinguishing polystyrene core and chipping concrete.

This building system is a load bearing wall construction which is seismic resistant and thermally insulated.

Buildings of any typology and architectural structural ranging from most simple to most complicated ones could be constructed.

The base element of this system is a modular panel composed of two electro-welded galvanized steel meshes having dia 2.5 – 5 mm are joined by connectors, in the middle of which is suitably shaped foam polystyrene plate. This polystyrene is self-extinguishing foam polystyrene which is used as disposable foam and as an insulating layer. EPS is made of carbon hydrogen and 98% air.

Once the panels are installed, they are anchored and finished with the application of light concrete on both the sides.

As a load bearing element, the double panels and the floors are finished during the installation with concrete of suitable grade placed into the slab ribs as well. In the case of non-load bearing walls, concrete plaster or even a pre-mixed one is applied for a thickness of at least 25mm.



R-Panels - Panel Building System using steel mesh, polystyrene core and chipping concrete

Salient Features :-

1. Good heat and sound insulation
2. Versatility in constructions
3. Lightweight but strong
4. Earthquake resistance
5. Resistance to Hurricane / tornado forces including blast explosion of 50 psi.
6. Fire resistance
7. Cost effective
8. Rapid installation
9. Energy efficient
10. Environmental friendly - non-toxic and CFC free.



2. Technology using expanded steel mesh panels, polystyrene beads & alleviated concrete

Materials used:- expanded steel type of galvanized steel mesh panels, cast and expanded in continuous process from 1.6mm thick and 30 cm wide galvanized sheet coil and Alleviated concrete made up of cement, fiber, sand and expanded polystyrene beads (1-4mm).

This system is entirely an on-site construction process. The concrete base and the foundations of the structure are prepared in a conventional manner by regular, poured, heavy concrete or alleviated concrete. In order to get good thermal insulation and good comfort from ground, it is advised to use at least one layer of alleviated concrete.

The galvanized steel mesh panels are tied to the soldered wire mesh and to the iron rods in the base and in the foundations and assembled in accordance with the design of the house. The complete skeleton of the construction along with the roof is formed by fitting galvanized steel wire studs horizontally and vertically into each other.

Once this procedure is completed, alleviated or light concrete is injected with a special concrete pump. The injected walls are then finished, leveled and smoothen from both the sides.



Technology using expanded steel mesh panels, polystyrene beads & alleviated concrete

Salient Features :-

1. Earthquake/hurricane/tornado resistant
2. Fire & termite resistant
3. Cost effective
4. Minimal man power
5. Energy efficient
6. Environment friendly



3. Pre-stressed precast prefab technology using hollow core slab, beams, columns, solid walls, stairs, etc

Material used:- cement concrete steel strands and reinforcing steel.

As the name says, these slabs, columns, beams, stairs, etc. are designed and manufactured in the factory shipped and erected at site.

The structural frame is commonly composed of rectangular columns of one or more storeys height. The beams are normally rectangular, L-shaped or inverted T-beams. They are single span or cantilever beams, simply supported and pin-connected to the columns.

The joint between the floors elements are executed in such a way that concentrated loads are distributed over the whole floor. This system is widely used for multi storeys buildings.



Pre-stressed precast prefab technology using hollow core slab, beams, columns, solid walls, stairs, etc

Salient features :-

1. Cost saving
2. Savings on exterior painting & finishing
3. Increased in carpet area
4. Energy savings



4. MONOLITHIC CONCRETE TECHNOLOGY USING PLASTIC FORM WORK

Material used:- M20 grade concrete wall, slabs and HYSD reinforcement of Fe415/Fe500 grade.

In this technology walls and slabs are cast in one operation and specially designed light weight form/moulds in concrete. Concrete is poured in forms and once after the setting of concrete takes place the forms are removed which gives box like cubical structure of the required architectural design.

This pre-designed formwork acts as some sort of assembly line production and enables rapid construction of multiple units of repetitive type.



MONOLITHIC CONCRETE CONSTRUCTION USING ALUMINIUM FORM WORK

Material used:- cement, aggregate, sand, steel, aluminum form work.

In this system concrete walls and slabs are cast monolithically at one pour, these allows reduction in thickness of concrete members below the minimum value than the conventional construction, just reducing the consumption of resources. This technology reduces the cost of maintenance and repair as compared to conventional system

Salient features:-

1. Cost effective
2. Fire resistant
3. Durable against earthquake



5. PRECAST CONCRETE PANEL

Material used:- cement, aggregate, sand with additives, welded mesh and plates, polystyrene core.

These load bearing panels are made of reinforced concrete with a polystyrene insulated core that varies in size from 40mm to 200mm depending upon the insulation requirements. These panels are moulded in a specially designed steel moulds under controlled factory conditions. Then the panels are removed from the moulds and stacked vertically for curing. Power and water conduits are installed in the panels during production. Due to cohesive structural design, this system requires only strip foundation for most of the buildings. The concrete panels can be designed with the strength of 5000 psi so to have a stronger thinner and light weight panels as compared to concrete blocks or most poured concrete walls.

This system takes two hours to prepare foundation and three hours for the panels to set.



PRECAST CONCRETE PANEL

Salient Features :-

1. Reduction in labour cost
2. Tornado/Hurricane damage resistance
3. Fire resistance
4. Earthquake resistant up to 6 on Richter Scale
5. Energy saving



6. Industrialized 3-S system

Material used :- Concrete, cellular light weight concrete slabs, precast column.

This industrialized construction technology is based on factory mass manufactured structural prefab components conforming to norms of IS standards and BIS certification mark.

In this system, dense concrete hollow column shell are used in combination with pre-cast dense concrete beams.

The hollow columns are grouted with appropriate grade of in-situ concrete along with secured embedded reinforcement of appropriate size, length and configuration to ensure monolithic continuous resilient behavior.



7. GFRG/ RAPIDWALL BUILDING SYSTEM TECHNOLOGY

Material used:- gypsum plaster reinforced with glass fibers.

This is a panel product suitable for rapid mass-scale buildings construction, was originally developed and used since 1990 in Australia. These panels are presently manufactured to a thickness of 124mm. The main application is in the construction of walls, it can also be used in floor and roof slabs in combination with reinforced concrete. It is mandatory to provide embedded RCC horizontal tie beam over all the walls below the floor slab/roof slab.

The panels may be unfilled, partially filled or fully filled with reinforced concrete as per requirement.

These panels possess substantial strength not only as load bearing elements but also capable to resist earthquake and wind. Buildings up to ten storeys in low seismic zones can be designed with these systems.

GFRG building systems can be constructed only with technical support or supervision by qualified engineers and constructors.



GFRG/ RAPIDWALL BUILDING SYSTEM TECHNOLOGY

Salient features :-

1. Water resistant
2. Fire resistant
3. Eco-friendly
4. Earthquake resistant
5. Reduction in construction cost

