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An Increase in lateral Resistance of Building through Light Concrete shot in Divider Walls and Technology of Light Partitions

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ABSTRACT

This paper is going to compare various kinds of light partitions and their performance methods. Light shot concrete can be used instead of ordinary shot concrete order to lightening of non-load bearing walls. In this way, a significant decrease will be caused in the amount of dead load of building and also some advantages such as partition consolidation to structure against peripheral loads.
Key Words: light partitions, seismic resistance, lightening and shot concrete.

1. INTRODUCTION

Some factors such as time and cost economy, safety, etc. are of important matters in construction. A method should be represented which responds above factors and is a modern one. As a result, lightening technologies aid construction industry which is a simple and applicable method for all rural, urban, factory and other buildings. The attributions and performance process need more studies that are going to be carried out along coming parts [1-3].

2. Modern Technology of Lightening

Building weight decrease is a structure matter. On the basis of regulation 2800, earthquake force is in a direct relation to building weight, in other word, building weight decrease can decrease base shear force caused by earthquake and decrease of base shear force decreases design forces.

Utilizing modern technology of lightening prevents material thrown furthermore safety supply which lead to time and cost economy. This technology discusses light materials in building and the manner of placing materials in building and finally decreases the weight of a building [3-5].

Todays, one of lightening method is utilizing light ceiling and sandwich walls. Main quality of these panels is their low weight. These styrene blocks are produced in 2 kinds of flammable and nonflammable. Most of engineers use these sandwich panels because of their resistance against earthquake, sound and heat insulation, low volume and time and cost economy. Composed materials of these panels are contracted in fire and produce toxic gasses in spite of refractory coating around them. Dilatory polystyrene panels (EPS) are used in order to prevent fire spread and toxic gasses. This panel was produced in 1950. It is resistant when confronting fire, reacts to imposing forces and eliminates any imposed force. This material does not react to water and is of a high stretch. It can be cut in different directions and can be recycled [4-6].

Fire-resistance is another advantage of these polystyrenes which do not spread fire. The parts that are in front of fire will be flamed but there will be no haze. These panels are utilized in refrigerators, food and drug containers, etc.

Fire-resistant polystyrenes have been utilized for more than 30 years in Europe. Foam polystyrenes are the best replace for clays and utilized in decorative plasters and walls. There is no especial replacement for these foams in Iran and their needs more studies.

3. Various Kinds of Light Panels

Sandwich Panels
FRP Panels
Honeycomb Core Panels
This paper studies attributions of sandwich panels and their effects on building.

4. Different Parts of Sandwich Panels:

Sandwich panels are replaced brick and clay walls because of their low weight. These panels include an intermediate nucleus and a network steel. This network is sprayed cement mortar after installation.

The nucleus of this panel (polystyrene) is very light and can be easily carried by a worker. The thickness of this polystyrene layer is 4-5cm, the width is 90-120-150cm and the height is 270-300cm. This glass fiber partcan

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be placed in different forms because of high stretch. A steelnetwork is placed in both sides of nucleus and this network includes bars of 3mm.

Fig 1. Different Parts of Sandwich Panels

As it can be observed in figure 1, the white color part is polystyrene layer which is of nugatory weight. The bars above this part are placed in a length and width of 5-10cm. this network is sprayed a soft cement mortar which is composed of aggregate material in a thickness of 5cm in both sides. These walls replace brick walls and have a divider wall role. Sprayed mortar on these sandwich panels are detected as following and are sprayed on steel mesh of these panels.

The size of aggregates should be in a way that they could pass meshes of steel network and stick to these panels.

Utilized water in concrete should be supplied of drinking water and as much as the mortar is neither loose nor hard. Utilized cement is type 2. The mixture of cement and sand is 1 to 4 or 1 to 3.

5.Attributions of Sandwich Panels

Low weights of foams facilitate their transportation, production and saves time and cost. A team of 4 workers can produce 120 m^2 panels in a work shift which is 40 m^2 for internal walls. These foams are safe in confrontation of insect, microbe, bacteria and termite attacks because of their toxic substances. Also, they are insulation in water absorption, heat and sound. Sandwich panels (12cm) uses less material and decrease occupying space.

6. The Effect of Panels on Building Weight:

Sandwich panels are of low weight and a consolidation in earthquakes. In other words, they are stretched and not broken or dispersed in earthquakes which increase building safety. Also, their repairing cost is very low.

Walls of hollow bricks and cement mortar weigh about 200 kg/m^2 but, sandwich panel walls weigh about 160 kg/m^2. This low weight decreases base shear force and transportation cost.

7. Light Concrete Spray

Various methods are represented in order to lighten weight of concrete and its specific gravity along recent decades which are used in light concrete as structural materials in especial conditions of long and short term form changing. The aim of above study was to apply light shot concrete in non-load panels with main criteria of decreasing specific gravity along its spraying. The minimum compressive resistance of concrete should bear peripheral loads such as wind and can be connected to adjunct parts of building. Utilized aggregates have important role in efficiency and pumping in ordinary shot concrete construction. Utilized rounded sands of 0-8mm diameter, twice-washed and aggregation curved accorded standard ACI-506 regulations. Also, utilized shot concrete was wet kinds. Applied cement was type Tehran II and the water supply was drinking water of Tehran. Nucleus of 2 inch diameter was taken from sprayed samples in wooden frames (8×50×50cm) under compressive resistance. Shot concrete were manually done. Process duration was 28 days under water of 10° C in wet resistant materials. Table 1 represents plan and mixture of ordinary and light shot concrete. There were 2 kinds of light shot concrete in experiments, the first one was produced by light shell casing and the second one was produced by light polystyrene. Utilized polystyrene was of extended granules in diameter of 0-2mm and LECA of 0-3mm. Here is a summary of structure method and attributions of polystyrene and LECA.

Polystyrene granule which is a production of petrochemical is changed into extended granule in especial steam machine so its specific gravity and water absorption is nugatory in comparison to other concrete materials. LECA aggregates are extended aggregates of clay in 1200° C. The aggregates will be exited rotary kilns in porous, rough and dark and brown color forms. Low weight, sound drop, low heat conductivity and fire-resistance are advantageous of these light aggregates. These materials can be utilized in structural concrete.

Table1. concrete mix for light concrete and shot concrete

Compressive resistance (28 days)	**Specific gravity**	**slump**	**Ordinary sand**	**SDD LECA**	**w/c**	**water**	**cement**	**plan**
mpa	Kg/m^3	cm	Kg/m^3	Kg/m^3		Kg/m^3	Kg/m^3	
11.5	1656	7	800	307	0.53	190	360	LSC^1
9.6	1549	6	644	307	0.51	185	360	LSC^2
8.3	1620	7	1058	polystyrene	0.43	172	400	PSC
17.3	2285	8	1720		0.45	180	400	NSC

8. Summary and Conclusion

Iran is located on an earthquake prone belt so, building resistant structures are of high importance. Also, a method should be represented in order to optimizing structures. One represented technique in lightening is utilizing sandwich panels.

Structures of sandwich panels are observed in lightness, resistance, consolidation, easy installation and performance, insulation, etc. Also, panels increase durability of buildings.

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