

Green concrete, Construction Materials and Products, Compatible with the Environment and Efficient

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ABSTRACT

The concrete comprised of concrete wastes which is compatible with the environment, are called green concrete. Green Concrete created a revolution in the history of concrete industry. This Article covers all dimensions related to this field and shows that how green concrete materials can be selected. This Article also provides the simple function of product materials like: Fly ash, ore dust, Marble powders/ small grains, plastic waste, recycled concrete and cement. Using fly ash, assists decreasing greenhouse gas diffusion and its negative impacts on the environment. In addition the assessments show that in each ton of concrete 0.9 tons of CO₂ is produced in each ton of Cement. Also, cement comprises 10 percent of total concrete weight. Therefore, most probably consuming green concrete causes the decrease in CO₂ diffusion in the atmosphere. The above Article has been written in order to prevent pollution and reuse of the material. Green concrete is an organic material which is substituted to cement and it is highly affordable, because it has used waste products and conserves energy. Consequently, it is ideally produced. All green concretes have higher resistance and sustainability than a normal concrete.

KEY WORDS: Environmental friendly concrete, Environmental friendly construction materials, Efficient Concrete, Green Concrete.

INTRODUCTION

Green Concrete, means the consumption of environmental friendly materials in concrete which causes the creation of a resistant and more stable system. Green Concrete is often cheap. The reason for example is: the use of waste products in shape of the substitute to the cement used, and their waste disposal has little costs. Their production energy use has also been little and they have higher sustainability too, but it should be noted that the concrete is not mixed with any colors.

The waste can produce new products and can be used as a mixture with other materials, in a way the use of natural resources to be limited and used efficiently. This protects the environment against the wastes. Non – organic materials rock dust, worn concrete or marble wastes are applied in Green concrete as granule materials. Moreover, substituting cement with fly ash, small silica in larger amounts causes the increase in quality of new green cement and finally it increases the level of raw material use and substitute fuels. This causes the low energy consumption and cement improvement. The article has been implemented, is in the event of various industrial products consumption and also concrete workers fillers. The consumption of natural cement wastes is not only affordable but also causes the increase in concrete features, like: sustainability.

This article expresses the tasks done for the environmental friendly concrete development, in brief and shows that these materials are suitable for Green construction materials. Consequently, Portland cement can be used. Specifically, in order to manufacture industrial procedures products like: fly ash, furnace ash and Silica. Furthermore, the tasks have also been done in order to use the suitable recycled materials and substitutes to concrete granule construction materials which have the great importance, for instance: Granule concrete recycled construction materials.

Product/ Material selection standard

General standard of Material/ Product Selection: [1]

- **Resources Efficiency:** resources efficiency essentially include the features of content recycled and natural or renewable, are efficient resources of production procedure which have been accessible at inner level they have been provided suitably, they also have had great sustainability and it is recyclable usable.
- **The quality of interior Air:** the quality of the interior air increases through some materials which have the following features:
- Little chemical diffusion or in-toxic: resistant against humidity and easy preservation.

- **Energy output and Efficiency:** This refers essentially to the issue that the energy applied in the concrete. These materials also show that the less energy is required during the construction of the concrete.
- **Water conservation:** Materials that help water conservation in parts of the land, cause the reduction of water consumption in construction material. Moreover, assist conserving water.
- **Value:** This feature can be regulated during building construction based on the life time and the construction material cost. They are compared with ordinary materials and generally allocate a defined percentage of total budget to themselves.

Fly Ash as cement materials:

Fly ash [1] is a powder which tends to move in the air. In case, it is not disposed, it causes air and water pollution, and it provides breathing problems, especially during inhalation and attaching the leaves, they cause the decrease in their performance power and their output level.

When coal is burnt and worn, produces some heat. The remaining material comprises of 80% ash fly and 20% ashes below. Fly ash is introduced as Average Grey color in Power supply stations of India, and it has the powder look which covers a considerable savings in energy and cement consumption but also it is more affordable and economic. Using fly ash follows with advantages. In this case, it can be hundred percent substitute to Portland cement. However, their substitute levels are over 80 percent which in this issue requires the chemical catalyzer. The researches done, has shown that the suitable level of substitution is 30%. Moreover, fly ash can cause the increase in especial features of the concrete, like: sustainability, because this can penetrate less water. Consequently, it is appropriate for concrete applications.

The consumption of fly ash in concrete has followed advantages in appropriate proportion and causes the increase of fresh and hard concrete application. The fly ash acts as the elastic capability of the concrete, the resistance and life span of the concrete. Generally, Fly Ash is mixed with the decrease in water and the increase in flow of adherence behavior provides advantages for the concrete. Referring to table 1 can realize Fly ash features.

Coarse –Grained Fly Ash Materials:

Several materials cause the light concrete which is produced by Fly ash. In addition to furnace ash, Fly ash pallets can be used in Cement used for Concrete, which are hardened through heat or chemical influence or through cement or lime. Such cases have more sustainable features.

In the middle of the year 1990, PACIFIC POWER [2] implemented a research on the production of Fly ash fine materials and evaluated the consumption of such fine materials in concrete production. Fly ash was delivered and then it was burnt in controlled heat, then it produced coarse –grained and combined materials.

Fly ash aggregates has especial gravity level 1.20 to 1.47, their bulk intensity is also between 60 kg/m³ to 790 kg/m³, and their high penetration is 16-24.8%. These features showed positive results for Fly ash as coarse –grained materials. [2]

Waste rocks in shape of coarse –grained material:

Mine rocks dust can be defined in shape of remained waste materials which are converted to particles with less than 4.75mm size after rocks' processing and extraction. Dusts during explosion, crushing and screening cause the production of sharp and angular particles. Using mine dust sometimes causes the increase in the amount of cement required to preserve the efficiency. The concretes which have such dusts, endure the resistance of sulfate and acid, also has less penetration level. Comparing above concretes with contractual concretes, we can achieve important issues. However, above concrete's water penetration is higher than the ordinary concrete. In order to preserve the desired efficiency of the concrete, the consumption of sands are limited because of high pasty volume with high cement. The amount of adherence intensively depends on the shape, texture, grading and the content of the sand dust. The increase in water requirement in concrete mixtures has applied through reverse impacts of the shape and the texture of mine sand and it could be decreased through water reducer mixer, at high level. Both samples cause the increase in construction costs. Referring table 2, the physical features of Ore dust could be realized. [1]

Recycled Concrete and construction materials:

Recycled grading concrete and graded construction materials are construction materials which are obtained by the recycled concrete and has various applications in road construction. These materials might cover: brick, sand, rubble or other shapes of stone products, which are integrated as materials. The shape, gradation and the grains might impact on the efficiency, transudation percentage, coating, sensitivity, fraction and elasticity of concrete. Sand made, can be applied as substitute to natural sand which is without loss of performance in concrete products based on cement. [2]

Marble waste in shape of fillers:

Marble is used frequently from ancient Greece till today as construction materials. Marble waste includes very coarse powders which are one of the environmental problems and issues around the world, though these waste materials can be applied for the development of some of the concrete and mortar. [1]

Plastic waste as composite concrete:

Plastic, is a material which has been developed because of its various usage and application, like: packing materials, yarn shrinkage, plastic buckets, plastic bottles, cups, plastic accessories, and it is a strong and flexible low cost material, but unfortunately they are irresolvable in nature. Plastics can be divided into two types: first; thermo-plastic which can be melted to recycle for plastic industry. These plastics are of Poly –Ethylene, Poly-propylene, Poly-amid, Poly- Oxy methylene, Poly tetra flora ethylene and Poly Ethylene trophy late. [1]

Plastic type 2: it is thermoset plastic. This plastic cannot be melted in high temperature and heat, because its chains have been bond together tightly and they are reticular. These types of plastics are: phenolic plastics, melamine, unsaturated polyesters, Resin epoxy, Silicon, polyethylene. At the moment, plastic wastes are disposed by burning or burial, though these procedures are very costly.

REBEIZ (1996) [3] dealt with reinforced and unreinforced polymer concretes features assessment. He implemented this task through unsaturated Resin Polyester, and based on unsaturated and recycled polyethylene plastic waste. The results show that resins have become firm according to the recycled **PET** and cause the creation of quality prefabricated concrete.

Competence or the Quality of the Green Concrete structures: [1]

There are several factors that have caused the increase in competence and the quality of Green Concrete. These factors are as below:

- The decrease in fix building weight : Decrease in Crane load level ; Control and increase in flexibility of lighter weighs
- Favorable Thermal resistance and resistance against fire and sound proof(instead of traditional Granite stones)
- Building decay resistance development
- Construction speed; the reduction of construction time
- The reduction of CO₂ diffusion in concrete industry, 30%.
- Industrial waste products functional increase, 20%.
- Sustainable development and without environmental pollution.
- Green concrete requires less repair and maintenance.
- Green concrete provides better capability and it sometimes more desirable than ordinary concrete.
- Great thermal resistance and fire resistance
- Concrete pressure resistance behavior and the proportion water to cement are higher in Green concrete than the ordinary ones.
- Green concrete flexural stability is almost the same as in the ordinary concrete.

Green concrete, is an important issue which has created a revolution in concrete industry. Since, production of green concrete from the waste of the manufactured concrete, is highly time- consuming, especially in the countries like India, and the reason for this is, the industries having problem with wastes disposal and they endeavor to decrease the environment impact level, specifically by reduction of Co₂ diffusion. Using green concrete can help reducing the great amount of wastes of several products, like: various irresolvable products.

Table 1: Chemical features of Fly ash [1]

	Tests done	Amounts (%)	Requirements in IS: 1320-1981
1	Waste Combustion	2.32	5.0(max)
2	Silica	42.04	SiO ₂ +Fe ₂ O ₃ +Al ₂ O ₃ =70
3	Iron	4.04	-
4	Aluminum	33.60	-
5	Calcium	12.73	-
6	Magnesium	0.00	5.0
7	Sulfate	0.040	3.0
8	Chloride	-	
9	Lime reaction	4N/mm ²	4.5

Table 2: Ore dust physical features [1]

	Feature	Ore and Dust
1	Special weight	2.54- 2.60
2	Relative Density	1720-1810
3	Penetration (%)	1.20- 1.50
4	Humidity	Nil
5	Particles less than 0.075mm	15-12
6	Analysis/ Screening	Zonell

RESULTS

Provided review in this paper, clearly explains the increase of principles and motivations of the application and consumption of recycled aggregates fabricated construction materials. However, there are limits of such material consumption. This report emphasizes on advantages and limits of recycled and fabricated grain materials level. The consumption of concrete products like green concrete in the future, not only causes Co2 diffusion in the environment but also reduces environmental impacts and creates more desirable economic conditions.

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