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Plasto Crete Block

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Abstract— Plasto Crete block is invention for recycling of waste plastic and proper use of waste plastic. It is a solution for solid waste management, now a day the garbage formed from our homes is 60% of plastic, and this is hazardous for environment. It gives the more chances for recycling the waste and proper treatment on waste. Plastic deposition is one of the biggest problems against country. India produces large quantity of plastic in daily, Only Pune City produce 1600 tonne of waste which contains 850 tonne of plastic waste daily. Plasto-crete block mainly affect on dead load, weight, permeability reduces the dead load of structure and permeability. We want to give a quality and ecofriendly material with more benefits as per market demand. In this process we replaced sand by plastic with suitable percentage as per density ratio. In plasto Crete block 23.4% of plastic is used by total volume of block. Which help to reducing waste plastic from environment and improving basic properties of construction material .Plasto Crete block provides good workability and it also affects on the permeability and shrinkage from wall, this block overcome the basic problem in construction industry with economical prospects.

Index Terms—Plasto-crete block, recycling of waste plastic, construction industry.

1. INTRODUCTION

Plastic is a material consisting of a wide range of synthetic or semi-synthetic organics that are malleable and can be molded into solid objects of diverse shapes. Due to their relative low cost, ease of manufacture, versatility, and imperiousness of water.

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Now a days world face problem of plastic deposition. Plastic having good property of water resisting and proofing also it have long life span. Construction industry wants good quality material.

Cement concrete hollow blocks have an important place in modern building industry. They are cost effective and better alternative to burnt clay bricks by virtue of their good durability, fire resistance, partial

resistance to sound, thermal insulation, small dead load and high speed of construction. Concrete hollow blocks being usually larger in size than the normal clay building bricks and less mortar is required, faster of construction is achieved .Also building construction with cement concrete hollow blocks provides facility for concealing electrical layout, water and sewer pipes wherever so desired and requires less plastering.

Siporex solid blocks are used as load-bearing and non load- bearing walls and as thermally insulating roof tiles in addition to being used as Hordi blocks or infills for ribbed slabs. They are produced with very precise dimensions with slim tolerance of ±3mm for thickness and width; therefore they are able to be laid by thin-bed mortar (Siporex glue) with a maximum of 3mm thick mortar joint. This results to a high quality wall structure with uniform thermal insulation and fast installation.

2. METHODOLOGY

Manufacturing process
The process of manufacture of plasto Crete blocks involves the following stages;

1. i) Proportion, ii) grinding of plastic
2. i) Mixing, ii) heating of plastic
3. Compacting
4. Curing
5. Drying

(1) PROPORTIONING:

It require suitable amounts of raw materials to produce concrete of desired quality under given conditions of mixing,

is known as proportioning. Average dry proportion is 1:7:1.6:0.4 (cement: aggregate: plastic: fly ash). Where plasto Crete blocks are compacted by power operated vibrating machines. The water cement ratio of 0.63 by weight basis can be used for plasto Crete blocks.

For the bonding purpose we provide heat to the plastic upto 40^0c and then it mix with other mixture.

(2) MIXING

The objective of thorough mixing of aggregates, cement, plastic, fly ash and water is to ensure that the cement-water paste completely covers the surface of the aggregates. All the raw materials including water are collected in a concrete mixer, which is rotated for about 3 minutes. The prepared mix is discharged from the mixer and consumed within 30 minutes.

Plastic is added in grinded upto 4.26mm in mixing proportion of 1.6 part of total weight of block. This plastic content the grinded particle of plastic bags, plastic bottle and food wrappers.

(3) **COMPACTING**

The purpose of compacting is to fill all air pockets with concrete as a whole without movement of free water through the concrete. Semi-automatic vibrating table type machines are widely used for making cement concrete hollow blocks. Wooden pallet is kept on the vibrating platform of the machine. The mould box is lowered on to the pallet. Concrete mix is poured into the mould and evenly levelled. The motorized vibrating table causes the concrete to settle down the mould by approximately 1 ½ to 1 ¾ inches. More of concrete is then raked across the mould level. The stripper head is placed over the mould to bear on the levelled material. Vibration causes the concrete come down to its limit position. Then the mould box is lifted by the lever. The molded hollow blocks resting on the pallet is removed and a new pallet is placed and the process repeated. The machine can accommodate interchangeable mould for producing blocks of different sizes of hollow or solid blocks.

(4) **CURING**

Plasto Crete blocks removed from the mould are protected until they are sufficiently hardened to permit handling without damage. This may take about 24 hours in a shelter away from sun and winds. The Plasto Crete blocks thus hardened are cured in a curing yard to permit complete moisturisation for at least 21 days. When the Plasto Crete blocks are cured by immersing them in a water tank, water should be changed at least every four days.

The greatest strength benefits occur during the first three days and valuable effects are secured up to 10 to 14 days. The longer the curing time permitted the better the product.

(5) DRYING

Concrete shrinks slightly with loss of moisture. It is therefore essential that after curing is over, the blocks should be allowed to dry out gradually in shade so that the initial drying shrinkage of the blocks is completed before they are used in the construction work.

Generally a period of 7 to 15 days of drying will bring the blocks to the desired degree of dryness to complete their initial shrinkage. After this the blocks are ready for use in construction work.

FLOW CHART:

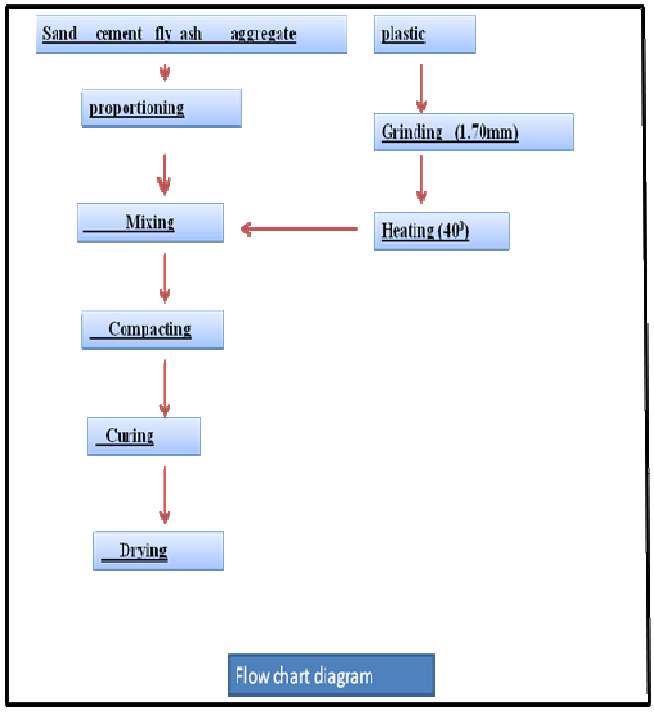

Figure.1 Flow Chart

3. DESIGN

Design is followed density ratio:

- Density of plastic 940 kg/cm^2
- Density of replacement material(sand) 1300 kg/cm^2
- Desire density of concrete block 650 kg/cm^2

Design of factor of safety for plastic use in block

"X" is factor of safety for plastic

Formula

Original density ratio=

(1.5 *X) * (plastic density ratio)

(1300/650) = 1.5*X*(940/650)
X = 1
Minimum factor of safety= 1 (plastic)

Design for percentage of plastic used in block:

Density of Siporex block (p) - 450 kg/cm^3
Volume of block 10*20*40cm
Weight of block – 3.6 kg
Proportion – 1:6 (C: A)
Density of hollow concrete block (p) - 650 kg/cm^3
Volume of block – 10*20*40cm
Weight of block – 5.2 kg
Proportion – 1:7 (C: A)
Mean density for plasto Crete block (p) – 550 kg/cm^3
Volume of block – 10*20*40cm
Weight of block – 4.4 kg
Proportion – 1:7:1.6:0.4(C: A: P: F)

Design a block for factor of safety 2.5:

(P mean/P plastic) /fos*100
550/ (950*2.5) = 23.40%

% of sand replacement
(% sand * P of plastic*100)
(0.7*0.234)*100=16.38%

(Pplastic/Psand)*100
(940*100)/ (1200*2.5) =31%
Safe % of use of plastic=
(W block –W mean)/W block*100
= (5.2-4.4)*100/ (5.2) =16.38

Shradation Design:

Normal size as per 25 mm=1mm
Density of sand =1300kg/m^3
(Normal size /Density of sand) =
(Size of plastic grade) / (FOS*density of plastic)
2.36/1300 = Y/ (2.5*940)
y = 4.26mm.
Size of plastic particles = 4.26mm

Figure.2 Plasto Crete Block

COMPARATIVE RESULT:

PROPERTIES	SIPOREX BLOCK	HOLLOW CONCRETE BLOCK	PLASTO CRETE BLOCK
DENSITY (kg/cm^3)	640	450	550
SIZE (cm)	10X20X40	10X20X40	10X20X40
WEIGHT (kg)	3.6	5.2	4.4
STRENGTH (kg/cm^2)	15	17.7	15.3

Table 1.Comparative results

4. CONCLUSION

The study of this process is innovative for new construction technique. Plasto Crete blocks having good compressive strength, water absorption capacity & weight. The permeability and shrinkage also reduced helps for plastic waste management by using the plastic in construction industry helps for plastic waste management. Result shows that the strength carrying capacity is approximate equal to 15.3 kg/cm^2. By using 23.40% of plastic we can achieve good factor of safety and strength.

Overall plasto Crete block having similar properties like other construction block. By using plastic in it

REFERENCES

[1]Patel M K, Joachim, RadgenP, WorrellE. Plastics streams in an analysis of production, consumption and waste generation. Resour Conserv Recycl 1998;24(3–4):191–215.
[2]PFSA (Plastics Federation of South Africa). Personal communication with Pretorius, A., Tech Support Manager,

PFSA. Cape Town, South Africa; 2001. Planning Commission (Government of India), Quality of Life Pointers, Delhi, India
[3]B N SHRIKE, Siporex research technique
[4]Report of PMC on plastic waste
[5]Hollow concrete block research
[6] Nitin H. Muthaa, Martin Patel, V. Premnath b "Plastics materials flow analysis for India"