NOVATEUR PUBLICATIONS
International Journal of Research Publications in Engineering and Technology [IJRPET]
ISSN: 2454-7875
VOLUME 3, ISSUE 6, Jun.-2017

BEHAVIOUR OF PLASTIC TILES UNDER FLEXURE TEST AND ABRASION TEST

PROF. MRS. SADHANA A. SHALU,
Asst. Prof. D.Y. Patil College Of Engineering, Akurdi, Pune.

MS. SONALI AMRUTKAR,
Students of BE, D.Y. Patil College of Engineering, Akurdi, Pune.

MR. DINKAR PAWAR,
Students of BE, D.Y. Patil College of Engineering, Akurdi, Pune.

MR. MAYUR DERE,
Students of BE, D.Y. Patil College of Engineering, Akurdi, Pune.

MR. CHETAN RAUT,
Students of BE, D.Y. Patil College of Engineering, Akurdi, Pune.

MR. SUFIYAN SHAIKH,
Students of BE, D.Y. Patil College of Engineering, Akurdi, Pune.

ABSTRACT:

The environmental decontamination and land pollution can be reduced by making best from waste. An alternative is provided for flooring or roofing tiles that consume nonrenewable resources, or produce negative environmental impact. In this research project three samples of tiles having 10 mm thickness were made. Waste Plastic from industries and epoxy resin along with hardner were mixed and tiles were casted. Then these tiles are tested in laboratory.

INTRODUCTION:

If waste plastic is burned , poisonous gases, smell and hazardous material are generated So, in this experiment we are using waste plastic material for the production of tiles. Solid waste plastic is crushed and converted into small and small particles of any appropriate colour. This plastic is mixed with binding agent and this homogenous mix is put into mould to set and get good tiles.

Due to increase in requirement of tiles, there is shortage of stones, marbles, and increase in soil erosion. So, the hunt for alternative tile comes to end at the innovation of this "plastic tiles". The process of manufacturing of plastic tile required less time and are easy to handle. The waste plastic used is 900 gm per tile. Epoxy resin 150 gm per /tile was added as binder, and then mixed with 150 gm (per tile) of hardner. All this casting was done at normal temperature. The tile was tested for abrasion.

Possibility of using plastic waste as a binding material instead of cement in the manufacturing of flooring tiles have been worked out by the researchers in the past. Such tiles have low porosity hence it makes tiles impervious. Tiles are also made from a mixture of PVC,CPVC PVDC. The tiles made from recycled plastic have higher flexural resistance and lower specific weight than ceramic tiles.

MOULD FOR PLASTIC TILES:

Mild steel was selected for fabrication of mould. It has following advantages over aluminium.

1. It is economical as compared to aluminium.
2. Also, it provides better impact resistance to mould.
3. It has better tensile strength.
4. It is weldable.
5. Having less than 2% carbon it will magnetize well and is relatively inexpensive.
6. It must be painted or otherwise sealed to prevent it from rusting.

After selecting the mould material for moulding process, the mould was prepared in actual which consists of following process:-

1. Welding
2. Drilling
3. Milling
4. Polishing
5. Fixtures
6. Fastening

Figure 1 Mould for casting of plastic tiles

COLLECTION OF MATERIAL:

The following materials were collected.

1. Waste crushed solid plastic material
2. M E K P (Methyl Ethyl Ketone Peroxide)
3. Epoxy Resin (glue)

1. WASTE CRUSHED SOLID PLASTIC MATERIAL:

Crushed solid plastic material having size 1 mm to 3 mm approximately Properties:

1. Very much amount of crushed material available.
2. It is hard as well as in crystal form.
3. It is produced from waste solid product.
4. It is available at low cost.

Figure 2 : Waste crushed solid plastic material

2. M E K P (METHYL ETHYL KETONE PEROXIDE):

M E K P hardener which is used to reduce the setting time of chemical reaction. It is used to improve the strength of material. Methyl ethyl ketone peroxide (MEKP) is an organic peroxide, a high explosive similar to acetone peroxide.

3. EPOXY RESIN (GLUE):

More amount of this chemical was required for the project.

PROCESS OF CASTING TILES:

Preparation of tiles consists of a thermosetting casting method. In this method, plastic material are crushed by using crushing machinery and then this material binds together with binding material like Epoxy resine, Epox y hardener(glue) with hardener MEKP. This mixture should be homogeneous and in appropriate proportion. We used thermosetting plastic in our project because it doesn't require any heat and pressure treatment.

Figure 3 : Casting Of Tiles at DYPCOE, Akurdi. Survey laboratory. STUDENTS OF BE (CIVIL), PROJECT GUIDE PROF. S.A. SHALU, CIVIL DEPT, AND OTHER STAFF MEMBERS OF DYPCOE.

PROPORTION OF CONSTITUENTS:

- Crushed plastic material
- Hardner
- Epoxy Resin

PROPORTION FOR FIRST TILE:

- 1:1:6 (Hardner:Epoxy Resin:Plastic Material)

PROPORTION FOR SECOND TILE:

- 2:2:6 (Hardner:Epoxy Resin:Plastic Material)

Daring the process following precautions were taken.

1. Mould was properly oiled before pouring material.
2. The material should be homogeneous in nature.
3. Mould was not disturb after pouring the material.
4. The mould was laid over the level surface.
5. The mould was leak proof.
6. Voids were removed properly,
7. Casting process was done at normal room temperature.

This tile consists of 70% solid crushed wastage plastic materials and 30% material (epoxy resin glue and hardener) are used.

There are 2 types of plastics:

1. Thermo softening
2. Thermosetting.

From which we've used the thermosetting plastic. For the binding purpose, we've used the thermosetting resin.

The epoxy glue was taken in one pan for the mixing purpose. After this, wastage crushed material and epoxy hardener were added in the pan. Further, MEKP were also added in appropriate quantity in the pan.

Before pouring the material into the mould, the mould was made leak-proof, by coating it with rubber. To make the mould stick-proof, the silicon spray was used as anti-sticking agent. After this, the mixture was made homogeneous with the help of stirrer. After pouring the material into the mould, some jerk was given to the mould, so as to remove the air bubbles if any.

One more precaution was taken that, the mould was kept undisturbed throughout the process, because, if it would have disturbed, then the thickness of tiles also varies. After this, the mould was kept in the sunlight for one hour for setting of plastic If it was placed in sunlight for less than an hour, then the plastic would not have set.

RESULT OF FLEXURE TEST:

Figure 4 : Flexure test carried out at DYPCOE, Akurdi, TOM laboratory.

Figure 5 : Flexure test carried out on plastic tile at DYPCOE, Akurdi, TOM laboratory.

OBSERVATION:

A) PLASTIC TILES:

Size of tile= 300 mm x 15 mm thick.

Table no. 1 : Observation table of flexure test.

	Identification Mark on tile	Span (mm)	Breaking Load (N)	Remark
1	M1	300	1100.72	BROKE
2	M2	300	2472.12	BROKE

RESULT OF ABRASION TEST ON PLASTIC TILES:

Fig. 6 : Abrasion test carried out on plastic tiles at DYPCOE, Akurdi TOM laboratory.

OBSERVATION:

Size of specimen: 65 mm x 65 mm x 15 mm

Original area of specimen: 4225 mm2

Original volume of specimen: 63375 mm3

Table no. 2 Observation table of abrasion test.

Sr.No	Initial thickness T1 (mm)	Final thickness T2 (mm)	Tav= T1-T2 (mm)	Initial wt of sample W1 (gm)	Final wt of sample W2 (gm)	Tw Gm = W1 – W2. gm
1	15	14	1	186	176	10
2	15	14.3	0.7	210	190	20

CALCULATIONS:

Average loss of thickness tav= (t2-t1)= 15-14= 1 mm for tile 1

Average wear i.e. loss of thickness is

tav= 0.7 mm for tile 2.

Weight reduction after abrasion test for tile 1 = 10 gm and for tile 2 = 20 gm.

IS STANDARD REQUIREMENTS :

As per IS 1237-1980, the abrasion shall not exceeded following values-

a) For general purpose tiles wear=4.0 mm

Table No. 3 : Comparison between ordinary tiles and plastic tiles

Sr. No.	Property	Ordinary Tile	Plastic Tile
1	Aesthetic Class	Good	Better
2	Water Absorption	Less	No Absorption
3	Visual Abrasion Resistance	More	Less
4	Chemical Resistance	Yes	No
6	Thickness	Less	More
7	Bond Strength	More	Less
8	Breaking Strength	Less	High
9	Weight	More	Light

APPLICATIONS OF PLASTIC TILES:

- In Gardens for good aesthetic view
- For parking floors
- For Footpath way
- In Bathroom

CONCLUSION:

It was concluded that plastic is harmful for environment and large amount of it is discarded in surrounding daily. So, we utilized this plastic waste in civil construction field by production of plastic tiles from it.

We manufactured best and efficient tiles but presently the production was uneconomical. In future It is possible to use another chemical for binding material such as polyester or other which may be economical.

REFERENCES:

1) *Pile or plastic tiles for flooring and like applications* i. Inventor: - Pierre Jean Couquet, Levelanet, France ii. Filed:- May 19,1970
2) *Method of making composite tiles containing waste plastic Inventor*:- i. Athos Polidori, Saludecio, Italy ii. Filed:- April 21,1998
3) *Use of plastic waste as a binding material in the manufacture of tiles: Case of waste with a basis of polypropylene Inventor:*- Roberts Mar ii. Filed:- 1974 USA.
4) *Ecological roofing tiles made with rubber and plastic wastes* i. Inventor:- Gaggino Rosana ii. Filed:-Nov 13,2013