

# An Experimental Study by Using E-Waste and Marble Dust on Property of Concrete

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A substantial growth in the consumption of electronic equipments is observed all over the world in twenty-first century, which has lead to huge quantities of e-waste. Today in current situation, the production of electrical and electronic devices is the fastest growing sector worldwide. E-waste, e-scrap or Waste Electrical and Electronic Equipment (WEEE) depict loosely discarded, obsolete or broken electrical and electronic device. Utilization of E-waste in concrete is an alternative solution to administer the growing quantity of the E-waste. This report illustrates the efforts to utilize e-waste as filler material in concrete with or without the help of admixture. The fresh and hardened properties of concrete with E-waste plastic such as slump, compaction factor, compressive strength at 7 & 28

days, split tensile strength at 7 & 28 days, water absorption, sulphate attack, chloride attack, bond test and chemical analysis were found experimentally. Three series of mixes, Mix 1, Mix 2 and Mix 3 were prepared with varying percentage of E-plastic filler material content (0, 5, 10, 15, 20%) and varying percentage of marble dust (0, 5, 10%). It was observed that the slump was slightly decreased with increasing the E-waste plastic quantity. The compressive and splitting tensile strength were reduced with increase in E-waste. Significant improvement in strength was found in the compressive strength of concrete with the presence of waste E-plastic as filler material and marble dust as 10% weight replacement to cement in concrete. Water absorption, sulphate attack & chloride attack result also improve by adding marble dust.

## I. INTRODUCTION

During the last few years, there is an increasing acknowledgment of our impact on the environment due to our lifestyle, while the need to adopt a more sustainable approach concerning our consumption habits emerges as of particular significance. Conservation of waste materials and by products is a partial solution to environmental and ecological problems. Use of these materials not only helps in getting them utilized in concrete and other construction materials, it helps in reducing the cost of concrete manufacturing, but also has several indirect benefits such as reduction in landfill cost, saving in energy,

and protecting the environment from possible pollution effects. Electronic waste consists of discarded old computers, TVs, mobile phones and washing machine, refrigerators, radios – basically any electrical or electronic appliance that has reached its end of life. Several tonnes of E-waste need to be disposed per year. Waste generated from the waste electronic equipments is a major problem for disposal. Efforts have been made in the concrete industry to use non-biodegradable components of E-waste as a partial replacement of the coarse or fine aggregates.

## II. Tests on concrete

1. Slump cone test
2. Compacting factor test
3. Compressive strength test
4. Split tensile strength test
5. Water absorption test
6. Sulphate attack test
7. Chloride attack test
- 8.

## III. Material Properties

### 1) Marble dust properties

Properties	Marble dust
Specific gravity	3.03
Colour	White
Form	Powder
Fineness % passing (sieve size)	90 $\mu\text{m}$

### 2) E-waste properties

Properties	E-plastic particle
Fineness modulus	6.67
Specific gravity	1.04
Absorption (%)	<0.2
Crushing value	<2%
Impact Value	<2%

## IV. CONCLUSION

- It was observed that the slump was slightly decreased with increasing the E-waste plastic quantity and compacting factor values are near to 0.97. Both can be improve by addition of Marble dust.
- The compressive and splitting tensile strength were reduced with increase in E-plastic. The E-plastic aggregates have poor shape and surface texture is smooth which greatly influenced the fresh and hardened properties of concrete.

- With comparing control concrete with 5%, 10%, 15%, 20% replacement of coarse aggregate by E-plastic waste, it reduced to 11.54%, 19.63%, 27.88% & 29.74% respectively. Significant improvement in strength was found in the compressive strength of concrete with the presence of waste E-plastic as filler material and Marble dust as 10% weight replacement to cement in concrete.
- Optimum content was found that 10% e-plastic and 10% Marble dust as filler material in concrete gives good strength result.

## V. REFERENCES

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