

# Determination of Physical And Engineering Properties of Thermal Power Plant Waste Pond Ash And Its Use In Concrete

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**Abstract-** An effects on concrete by replacement of sand as thermal power plant pond ash on properties such as compressive strength, split tensile strength, flexural strength, are studied. The natural sand was replaced with pond ash by 0%, 20%, 40%, 60%, 80%, and 100% by weight, at fixed water-cement ratio 0.48. Results shows that the harden properties of concrete such as compressive strength, split tensile strength and flexural strength decreased as the percentage of replacement of pond ash increase up to 40% and decreases as replacement percentage increase more than 40% compared to controlled concrete. In this slump was kept constant  $100 \pm 10$  mm respectively and achieve the required slump Plastizer were used as directed by the manufacturer, for this work dosage was 0.21% to 0.25%. It was observed that up to 40% replacement of sand as pond ash, the Harden properties are approximately same as that of the controlled concrete.

**Keywords:** Control Mix, Plastisizer, Mix Design, Split Tensile Strength, workability

## I. INTRODUCTION

Pond Ash is the by-product of the thermoelectric power plants, which recognize an unused material and demolition is an important environmental issue and also requires a proportion of dumping areas. In fact, components are three kinds of ashes of the 3 thermoelectric power plants i.e (i) fly ash, (ii) pond ash, (iii) bottom ash. Fly Ash is possessed by automatic or electrostatic fumes of central precipitators; the bottom ash is possessed from the lowermost of the boiler. When the above-mentioned two types of ash, varied simultaneously, are transferred in the form of sludge and reserved the gaps, the boiler is named ash pond or bottom ash and ashes are mixed with water to form slurry pumped ash zone. Ash is deposited in the ash and excess water is poured. This is called pond ash deposited ash. In any case, the present situation of the use of pond ash in India is terrible. Around 8% of the produced fly ash is being utilized commercially. This demonstrates that there exists tremendous potential of use of

pond ash in geotechnical constructions with a specific end goal to safeguard the important top soil.

Following are the objectives of this work-

- 1) To determine the Engineering properties of collected pond ash sample and collected sand sample and compare them.
- 2) To use the collected pond ash in different grades of concrete.
- 3) To compare the fresh concrete properties like workability of conventional concrete sample and concrete produced from pond ash.
- 4) To evaluate strength parameters like compressive strength and flexural strength of concrete produced from pond ash.

The following materials are used during the research work-

- Pond Ash
- Indian Standard Sand (IS Sand)
- Cement
- Coarse Aggregates
- Super Plasticizer
- Water

results of the various experimental investigations are reported and discussed

**Table 1:** Compressive strength of sample containing Pond Ash

Pond Ash %	0	20	40	60	80	100
Compressive strength MPa after 7 days	20.12	22.15	22.45	19.45	18.56	16.02
Compressive strength MPa after 14 days	31.59	32.30	32.50	28.02	24.36	20.10

Compressive strength MPa after 28 days	33.05	34.45	34.56	32.25	26.36	24.30
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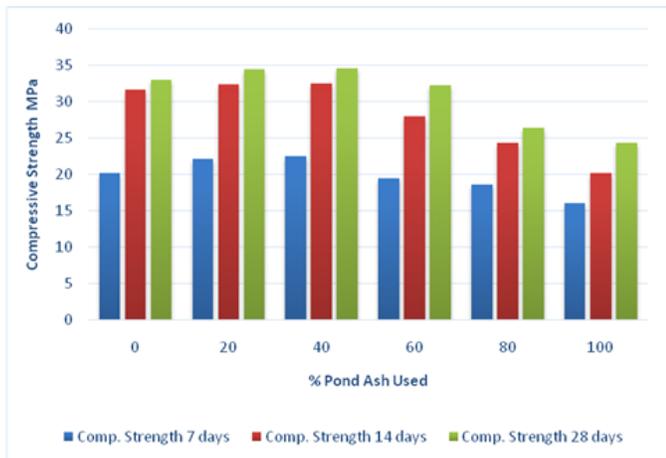


Figure 1: Compressive Strength Contain of Pond Ash

Here 0% to 100% of pond ash was replaced with sand and optimum percentage of replacement was found at 40% replacement of pond ash with sand. For controlled concrete the compressive strength was found for 7, 28, and 56 days. It was observed that for 20% sand replacement the compressive strength was increased as compared with controlled concrete. Then after that compressive strength were decreased from 40% to 100% replacement. The pond ash concrete gains strength at a slower rate in the initial period and acquires strength at faster rate.

Table 2: Flexural Strength of M25 having Pond ash

Pond Ash %	0	20	40	60	80	100
Flexural strength MPa after 14 days	2.89	2.80	2.90	2.45	2.40	2.30
Flexural strength MPa after 28 days	3.50	3.60	3.85	3.25	2.90	2.58

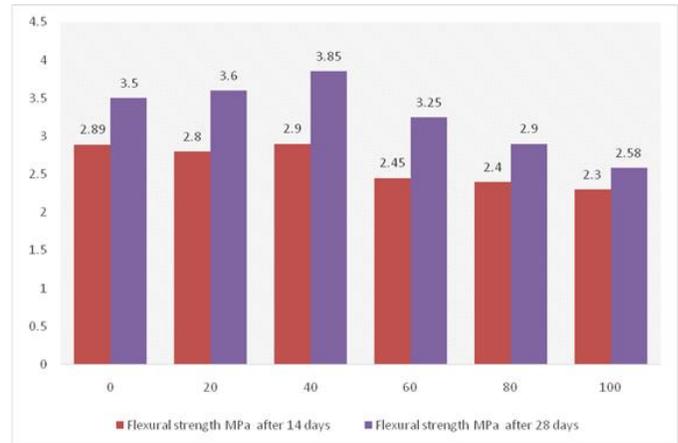


Figure 2: Flexural Strength of M25 having pond Ash

## II. CONCLUSIONS

- After the review of all properties of pond ash it can be concluded that pond ash has properties similar to Indian standard sand hence it can be used as fine aggregate in construction.
- The compressive strength for 7, 14 & 28 days was increased up to 40% replacement and after that compressive strengths were decreased from 60% to 100% replacement.
- The split tensile strength for 28, days was increased for replacement upto 40%, after that it was decreased for remaining replacement.
- The flexural strength for 14 and 28, days was increased for replacement upto 40%, after that it was decreased for remaining replacement.

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