

# ASSESSMENT OF RECYCLED AGGREGATE CONCRETE

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## ABSTRACT

In this rapid industrialized world, it has been accepted that by the use of recycled aggregate we can conserve our natural resources and environment and we can also decrease energy used in the production. In some of the countries recycled concrete aggregates are used for maintenance and construction, specially where there is less availability of aggregates. Various papers have already been published on recycled aggregate concrete, in this paper detailed experimental assessment on mechanical properties of recycled aggregate concrete. Huge volume of construction waste is generated when any demolition or construction activity takes place such as demolition of old buildings, bridges, subways, flyovers, bridges, etc. By the use of recycled aggregate concrete in construction we can conserve natural resources and also can minimize the construction waste which has adverse effects on our environment.

**Keywords:** Recycled aggregate concrete, natural aggregate, construction waste, demolished structure, mechanical properties.

## I. INTRODUCTION

As we know that concrete is the premier construction material around the world and widely used in all types of civil engineering works. Almost 70-80% of concrete compositions are aggregates, so it is beneficial to use to use recycled concrete aggregates in concrete for construction work and it will also solve environmental issues. The use of recycled aggregate concrete is in practice since the end of World War II and is used in stabilizing the base course of the roads. The wastes derived from demolished concrete structures and construction works are of large quantity and goes on increasing with time. To reduce the excess of waste material it is good step to use recycled aggregates in construction work. In some of regions the cost recycled aggregates is less than 25 to 35% less than natural aggregates. India is among the top five biggest construction countries in the world. A new report of Global construction 2030 forecasts the volume of construction output will grow by 85% worldwide by 2030, with three countries – China, U.S and India, leading the way and accounting for 57% of all global growth.

It has been seen that use of recycled aggregate instead of natural aggregate in construction is very popular among the researchers. The researchers compares the different mechanical properties of recycled aggregate concrete with natural aggregate concrete, some of them observed that recycled aggregate concrete has less compressive strength and low workability and some of the researchers observed

that recycled aggregate concrete has high compressive strength as it has more rough surface and more angular shape which leads to better bonding thus the compressive strength of concrete increases.

## II. OBJECTIVE OF THE STUDY

- To compare the results of various tests performed on recycled aggregate concrete and natural aggregate concrete.
- To study effectiveness of recycled aggregate in concrete.
- To study mechanical properties of concrete by using recycled aggregates
- To reduce the quantity of constructional waste materials.
- To reduce the cost of construction by reduction of transportation and crushing process of natural aggregates.

## III. TESTS ON RECYCLED AGGREGATES

**3.1 Slump test (workability):** Workability is defined as the property of concrete which determines the amount of useful internal works necessary to produce full compaction. In other words it can also be defined as the ease with which concrete can be compacted 100%, mixed, transported, placed and finished.

**3.2 Compressive strength test:** In this test a mould of either 150mm or 100mm is prepared, sample is then immersed in water after 24 hours for curing up to desired (28) days. Sample is then tested for its compressive strength in universal testing machine until specimen is crushed and it give compressive strength.

This test may be performed on cylindrical mould also. The strength of cylindrical mould nearly comes out 0.8 times the strength of 150mm cubical mould. Size of cylindrical mould diameter is 15 mm and length 30cm.

**3.3 Split tensile strength test:** In split tensile strength test a compressive force is applied to the specimen such that specimen fails due to the induced tensile stress. A cylindrical specimen is made with diameter 150mm and 300mm length; load is applied at the rate of 2N/mm<sup>2</sup> per minute. Specimen is finally failed by splitting along the diameter and maximum applied load is recorded.

## IV. PROPERTIES OF RECYCLED AGGREGATES

**4.1 Specific gravity and water absorption:** The specific gravity of an aggregate is considered to a measure of the

quality or strength of the material. Aggregates having low specific gravity values are generally weaker than those having higher values. Aggregates having higher water absorption value are porous and thus they are weaker. Higher water absorption value decreases workability of the concrete.

**4.2 Flakiness index:** The flakiness index of aggregate is the percentage by weight of aggregate particles whose least dimension is less than three fifth or 0.6 of their mean dimensions.

**4.3 Elongation index:** The elongation index of an aggregate is the percentage by weight of particle whose greatest dimension or length is greater than one and four fifth or 1.8 times their mean dimension. The elongation test is not applicable for sizes smaller than 6.3mm.

## V. CONCLUSION

This paper initially reviews the various mechanical properties of recycled aggregate concrete like- specific gravity, water absorption, compressive strength, tensile strength ,etc. By the use of recycled aggregate in construction, the energy and cost of transportation of natural aggregates can thus be eliminated which ultimately reduces the constructional waste materials.

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