

# COMPARISON OF VARIOUS PROPERTIES OF VIRGIN & RECYCLED AGGREGATES

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## ABSTRACT

*This paper presents an experimental study on the properties of fresh concrete prepared with recycled aggregates. Concrete mixes with a target compressive strength of 35 MPa are prepared with the use of recycled aggregates at the levels from 0 to 100% of the total coarse aggregate. The influence of recycled aggregate on the slump and bleeding are investigated. The effect of delaying the starting time of bleeding tests and the effect of using fly ash on the bleeding of concrete are explored. One of the major problems with the use of recycled aggregates in structural concrete is their high water absorption capacity which leads to difficulties in controlling the properties of fresh concrete and consequently influences the strength and durability of hardened concrete. Several concrete mixes were prepared with 100 % recycled aggregates and the results were compared to that of a control mix. SEM was conducted to examine the microstructure of selected mixes. The results showed that concrete with acceptable strength and durability could be produced if high packing density is achieved.*

**Keywords:** *Recycled aggregates, virgin aggregates, concrete properties, construction and demolition.*

## 1.Introduction

The main goal of the current research project is to investigate variability of aggregate properties and their impact on concrete production. Aggregate strength, gradation, absorption, moisture content, specific gravity, shape, and texture are some of the physical and mechanical characteristics that contribute to the strength and durability of concrete. Therefore, it is necessary to evaluate these properties before utilizing the aggregate. In this paper, properties of recycled aggregate from an unknown source collected over a period of 6 months from a recycling plant were evaluated. In addition, properties of concrete produced with 100 % recycled aggregates were investigated. One of the major problems with the use of recycled aggregates in structural concrete is their high water absorption capacity which leads to difficulties in controlling the properties of fresh concrete and consequently influences the strength and durability of hardened concrete. Hanson and Sagoe-Crentsiet al. suggested that recycled aggregates should be pre-wetted or saturated with water to prevent a rapid decrease in concrete workability. Poon et al. demonstrated that the initial slump of a concrete mixture depended on the initial free water content, while the slump loss of the mixture with time was related to the initial moisture state of the aggregates.

## 1. Experimental Work

S.No.	Name of Test	Test Method	Result	Unit
1	Crushing Value	As per IS : 2386 Part-4-1963	34.47	%
2	Bulk Density & Voids	As per IS : 2386 Part-3-1963	1.384	%
3	Water Absorption	As per IS : 2386 Part-3-1963	4.30	%
4	Loss Angeles Abrasion Value	As per IS : 2386 Part-4-1963	39.32	%
5	Specific Gravity	As per IS : 2386 Part-3-1963	2.36	%
6	Flakiness Index		5.58	%
7	Elongation Index	As per IS : 2386 Part-1-1963	10.65	%
8	Gradation of Aggregate	As per IS : 2386 Part-1-1963	Sieves nos.	% passing
40mm			100.00	
20mm			54.74	
10mm			6.95	
4.75mm			0.82	
2.36mm			0.49	

## 2. Conclusion

We should prefer to use virgin aggregate because they believe it has a higher performance rating than recycled; however, from a product performance perspective, recycled aggregates are just as durable and strong as virgin. The biggest difference between virgin and recycled aggregate is the impact on the environment. Virgin material needs to be mined, and this requires digging up land, using a variety of tools and equipment, and then processing the material for use. All of this can use valuable natural resources, cause pollution, and consume energy. Since recycled aggregates are already coming from a previously existing product, they do not need to be mined for use. This allows companies to conserve the natural resources while also eliminating the need for products to take up space in a landfill. There are many factors that determine the cost of aggregate, and when comparing recycled vs. virgin aggregate, recycled is generally the more cost-effective option. Since companies don't have to mine or produce new material, they can price the recycled material lower than the virgin material. Since recycled producers already have the raw material at their facility, costs are generally lower, and savings are passed on to the consumer. In some instances, you may actually get more recycled material than virgin material for the same or a lower price. For example, recycled CA6 is 15% lighter than virgin CA6, so you receive 15% more volume per ton. All of this adds up to a significant cost savings.

## 3. References

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