

# MECHANICAL PROPERTIES OF RECYCLED AGGREGATES

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## ABSTRACT

*This paper discusses the suitability of producing concrete with 100 % recycled aggregate to meet durability and strength requirements for different applications. Aggregate strength, gradation, absorption, specific gravity, shape and texture are some of the physical and mechanical characteristics that contribute to the strength and durability of concrete. In general, the quality of recycled aggregate depends on the loading and exposure conditions of the demolished structures. 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. 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.*

**Keywords:** *Recycled aggregate. Fresh Properties. Bleeding concrete properties, physical properties, mechanical properties.*

## 1.Introduction

Utilizing recycled aggregate is certainly an important step towards sustainable development in the concrete industry and management of construction waste. Recycled aggregate (RA) is a viable alternative to natural aggregate, which helps in the preservation of the environment. One of the critical parameters that affect the use of recycled aggregate is variability of the aggregate properties. Quality of the recycled aggregate is influenced by the quality of materials being collected and delivered to the recycling plants. Therefore, production of recycled aggregate at an acceptable price rate and quality is difficult to achieve due the current limitations on the recycling plants. These issues concern the clients about the stability of production and variability in aggregate properties. 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. They also reported that in the case of using recycled aggregates in the saturated surface-dried (SSD) state, the high water content inside the aggregate particles may result in bleeding during casting. The Concrete Technology Unit of University of Dundee showed that the use of recycled aggregate as a partial replacement of natural aggregate leads to slight increases in slump and compacting factor, and a high degree of bleeding. Bleeding has negative effects on the properties of concrete, which is referred to the movement of water to the surface of fresh concrete a result of the settlement of solid particles. A high degree of bleeding can significantly increase the near-surface water-to-cement (W/C) ratio, leading to a lower concrete strength at the cover zone. The formation of a network of capillary pores due to the movement of bleeding water also reduces the durability of concrete in this zone. In

addition, bleeding water trapped along the underside of reinforcing steel can reduce the bond strength and increase the risk of corrosion. The degree of bleeding in fresh concrete is dependent on a number of factor.

## 2.Experimental Work

TEST RESULTS				
S.No.	Name of Test	Test Method	Result	Unit
<b>A)</b>	<b>Recycled Aggregate Sample</b>			
1	Crushing Value	As per IS : 2386 Part-4-1963	34.67	%
2	Impact Value	As per IS : 2386 Part-4-1963	27.79	%
3	Water Absorption	As per IS : 2386 Part-3-1963	5.60	%
4	Loss Angeles Abrasion Value	As per IS : 2386 Part-4-1963	35.74	%
5	Bulk Density & Voids	As per IS : 2386 Part-3-1963	1.440	
6	Specific Gravity	As per IS : 2386 Part-3-1963	2.31	
7	Flakiness Index		5.40	%
8	Elongation Index	As per IS : 2386 Part-1-1963	16.61	%
9	Gradation of Aggregate	As per IS : 2386 Part-1-1963	Seives Nos.	% Passing
			40 mm	100.00
			20mm	63.16
			10mm	10.88
			4.75 mm	0.51

## 3.Conclusion

Natural Aggregate	Recycled Aggregate
Aggregates are derived from a variety of source rocks and mined primarily by surface methods.	Aggregates are derived from debris of road and building construction projects.
Quality depends primarily upon the physical and chemical properties of the source deposit.	Quality varies significantly due to large variation in type and impurities of debris sources.
Must conform to Federal, State, or local technical specifications for each product application.	Must conform to Federal, State, or local technical specifications for each product application.
Processing generally occurs at mine site, often outside city limits. Resource suitable for multiple products.	Processing often at centrally located site in area using mobile urban equipment. Product mix often limited
Mine and plant layout in part determines the efficiency of an operation.	Recycler must be able to adjust material feed and output to meet changing product requirements.

## 4.References

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