CERUCUK
Volume 7 No. 2 2023 (113-120)

ANALYSIS OF EFFECT WATER REDUCTION AND ABRASION VALUE OF COARSE AGGREGATE PADA BETON BY USING SUPERPLASTICIZER VISCOCRETE 1050 HE

Krisna Varian Ardhika Prambudi, Dr. Eng. Irfan Prasetia, S.T., M.T.
Civil Engineering Study Program, University of Lambung Mangkurat
E-mail : krisnapram31@gmail.com

ABSTRACT

With the rapidity of the construction world , the use of materials will also increase, one of which is the increasing use of concrete. One of the developments is to add additives to the concrete dough to be able to achieve the expected results. This study uses Superplasticcizer Viscocrete 1050 HE which is the latest type of output from PT. SIKA has the advantage of being able to reduce water by more than 30%. The discrete content used is 1% of the weight of cement and the water reduction content is 0% to 40%. The results of the concrete compressive strength test were obtained results with the use of Viscocrete 1050 HE 1% with a reduction of water of 35% having a maximum concrete compressive strength value of 40.2 Mpa at the age of 28 days for coarse aggregates that have a low abrasion value (AK1) and of 39.8 Mpa at the age of 28 days for aggregates rough that has a high abrasion value (AK2).

Keywords: Water Reduction, Superplasticizer, Abrasion

1. INTRODUCTION

Currently, the development of technological science is developing very rapidly, for example, technology in the construction field is also progressing rapidly, one of which is technology on concrete, and every aspect is always related to concrete. The magnitude of the strong value of concrete is influenced by several things such as cement water factor, cement type, aggregate ukuean, and even the nature of the aggregate.

To obtain a high compressive strength value, can be obtained with various things, one of which is that it is used with an admixture superplasticizer which has a function that can reduce the amount of water use.

Rahman, et al (2009) conducted researched on reducing water in concrete mixtures. With variations in reductions in water by 5%, 10%, 15%, and 20% with the addition of 1% Sika to a concrete dough. It was found that in this study a reduction of air by 20% resulted in a maximum compressive strength value of concrete which was 40.05 Mpa the age of 28 days.

Research conducted by Firmansyah (2018) regarding the effect of reducing water and adding a Superplasticizer on the compressive strength of concrete. This study plans water reduction with various variations, namely by 5% to 30%, and the addition of Superplasticizers with various variations. This, the results obtained by reducing water by 30% with the addition of *a* Superplasticizer of 3.29% obtained the largest compressive strength value of 49.2 MPa in your 28 days.

2. LITERATURE REVIEW

Concrete

Concrete is a mixture of hydraulic cement or other portland cement, stone, sand, and water, with or with additives that form a solid mass.

Ingredients Add

Is an ingredient that is added to the concrete dough during the ongoing work of mixing other ingredients. And also has the function of changing the properties of the concrete itself so that it is more suitable for the planned work.

Superplasticizer

It is a chemical whose function is specifically to improve the quality of concrete, namely by pouring water use *(water reducing)*.

3. RESEARCH METHODS

Figure 1 and Figure 2 are the research methods that will be carried out.

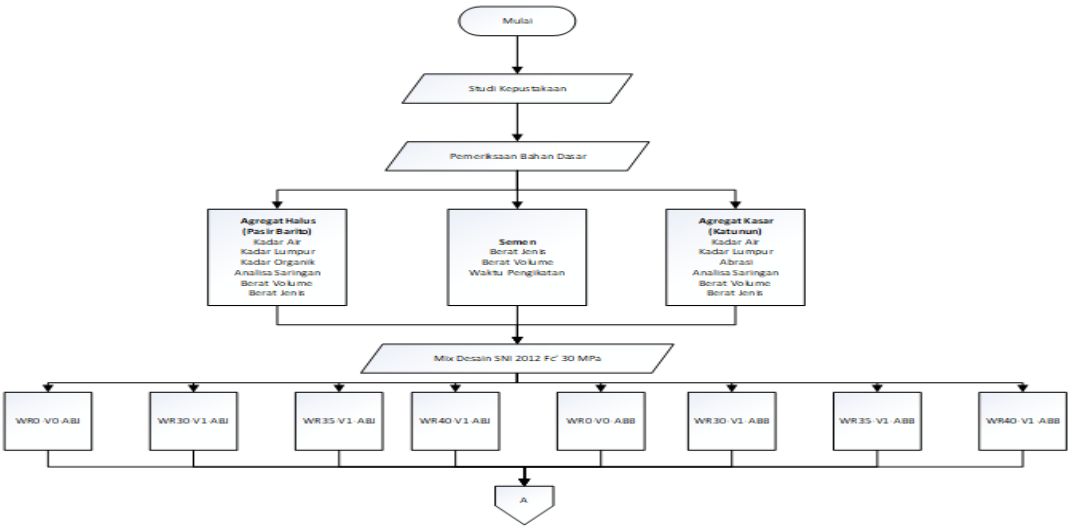


Figure 1 Flowchart

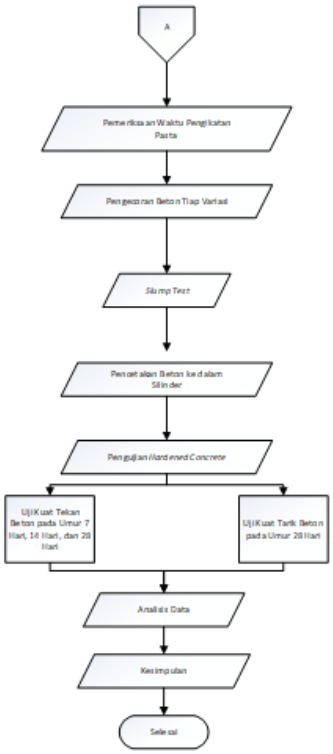


Figure 2 Advanced Flowchart

Table 1 Nomenclature of Cotton Coarse Aggregates

No.	Kode	Penjelasan
1	WR0 – V0 – AK1	Beton tanpa Penambahan *Superplasticizer* dan pengurangan air dengan agregat kasar Katunun
2	WR30 – V1 – AK1	Beton dengan pengurangan air 30% serta Penambahan *Viscocrete 1050 HE* 1,00% dengan agregat Katunun
3	WR35 – V1 – AK1	Beton dengan pengurangan air 35% serta Penambahan *Viscocrete 1050 HE* 1,00% dengan agregat Katunun
4	WR50 – V1 – AK1	Beton dengan pengurangan air 40% serta Penambahan *Viscocrete 1050 HE* 1,00%

Table 2 Awang Will's Rough Aggregate Nomenclature

No	Kode	Penjelasan
1	WR0 – V0 – AK2	Beton tanpa Penambahan *Superplasticizer* dan pengurangan air dengan agregat kasar Awang Bakal
2	WR30 – V1 – AK2	Beton dengan pengurangan air 30% serta Penambahan *Viscocrete 1050HE* 1,00% dengan agregat Awang Bakal
3	WR35 – V1 – AK2	Beton dengan pengurangan air 35% serta Penambahan *Viscocrete 1050HE* 1,00% dengan agregat Awang Bakal
4	WR40 – V1 – AK2	Beton dengan pengurangan air 40% serta Penambahan *Viscocrete 1050HE* 1,00% dengan agregat k Awang Bakal asar bagus

4. RESULT AND DISCUSSION

Inspection of Coarse Aggregates and Fine Aggregates

The test results at the Laboratory for fine aggregates of Barito sand and coarse aggregates of Cotton and coarse aggregates of Awang Bakal can be seen below

Slump Test

Figure 3 Slump Test Results

Table 9 Slump Test Results

Kode	Penurunan *Slump* (cm)
WR0 – V0 – ABJ	7
WR30 – V1 – ABJ	18
WR 35 – V1 – ABJ	15
WR40 – V1 – ABJ	4
WR0 – V1 – ABB	5
WR30 – V1 – ABB	17
WR35 – V1 – ABB	13
WR40 – V1 – ABB	3

Results of 28 Days Old Concrete Compressive Strength

Figure 4 AKJ Concrete Compressive Strength Results

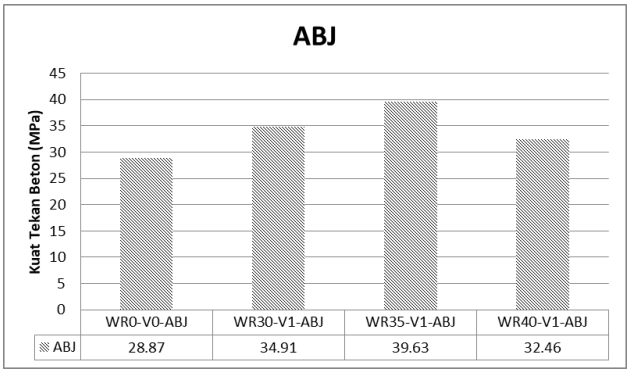
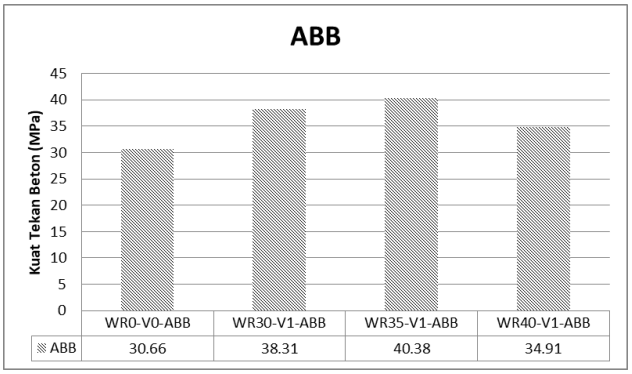


Figure 5 AKB Concrete Compressive Strength Results



Based on the second above, the water drop of 35% has the highest compressive strength value in coarse aggregates with low abrasion values (AKB) and high abrasion (AKJ). The result obtained was 40.48 MPa with a coarse aggregate that had a low abrasion value (AKB). In contrast, coarse aggregates that have a high abrasion value (AKJ) obtained a compressive strength value of 39.63 MPa.

5. CONCLUSION AND SUGGESTION

CONCLUSION

Research conducted at the Structure and Materials Laboratory of Lambung Mangkurat University regarding the effect of water reduction on concrete using a *discrete* 1050 HE *superplasticizer* can be concluded as follows:

1. Based on research that water reduction has an influence on the compressive strength value of concrete, that is, the higher the reduction of water, the higher the compressive strength value of concrete. In this study a water reduction of 30% obtained a concrete compressive strength result of 38.31 Mpa while a water

reduction of 35% got a concrete compressive strength result of 40.38 MPa, but the 40% reduction in water experienced a decrease in the compressive strength value of concrete by 34.91 MPa. So that the optimum water reduction to obtain the maximum compressive strength value is achieved at a water reduction of 35%.

2. Optimum water reduction to obtain the maximum compressive strength value was achieved at a water reduction of 35% whereas WF35-V1-AKJ (ugly/high abrasion coarse aggregate) with an abrasion value of 17.07% obtained a concrete compressive strength value of 39.63 MPa, on the contrary, the result for WF35-V1-AKB (good/low abrasion coarse aggregate) with an abrasion value of 10.43% got a value result in concrete compressive strength of 40.38 MPa. The compressive strength value of concrete has a difference of 1.02% between the compressive strength value of high abrasion concrete and low abrasion.

SUGGESTION

1. Further research is needed for the mixing of stones with aggregates with low abrasion values and aggregates with high abrasion values.
2. Further research was carried out for the use of abrasion values that were higher than those already studied.
3. It is necessary to observe the rules of the correct concrete casting process.
4. It is necessary to conduct further research on the variation in the use of the Percentage of *Superplasticizer Viscocrete 1050 HE*.
5. At the testing stage of the sample, sulfur *capping* can be carried out so that during testing the compressive strength is more stable.

REFERENCES

ASTM C494. 2013. "**Standard Specification for Chemical Admixtures for Concrete.**" *ASTM International* 04: 1–9.

National Standardization Agency. 2008. "SNI 3419-2008: **How to Test Concrete Abrasion in the Laboratory.**" *National Standardization Agency*.

National Standardization Agency. 1996. "**Test Method of The Number of Materials in aggregates That Pass the Sieve No. 200 (0.075 mm).**" *Sni 03-4142-1996* 200 (200): 1–6.

Indonesian National Standardization Agency., 1989. n.d. "**.**" ***Specification of Building Materials Part A (Building Materials Not Loam).****SK SNI S-04-1989-F*. *Indonesian.*

Damayanti, Yuni. 2015. **"The Relationship of Coarse Aggregate Abrasion Values to concrete compressive strength."** *Senarigti*, 9–10.

DZIKRI, MUHAMMAD, and MOCHAMAD FIRMANSYAH SOFIANTO. 2018. **"Effect of Addition of Superplasticizer on Concrete With Copper Waste (Copper Slag) On Compressive Strength of Concrete According to Its Age."** *Civil Engineering Engineering* 2 (2/REKAT/18).

Fast, V A. 2007. "**THE EFFECT OF WATER REDUCTION AND THE ADDITION OF A SUPERPLASTICIZER ON THE STRENGTH OF CONCRETE OF 25 MPa QUALITY."**

Nugroho, Aditya. 2014. **"Faculty of Civil Engineering and Planning of Gunadarma University,"** no. 16309863: xviii + 123 + Appendix.

Rahman, Abdul, Crisna Djaja Mungok, and Asep Supriyadi. 2009. "209558-**The Effect-of-Variation-Reduction-Of-Water-In-C,"** 1–11.

SNI-03-1970-1990. 1990. **"SNI 03-1968-1990 Test Methods On Fine and Coarse Aggregate Sieve Analysis."** *Indonesian National Standards Agency* 200 (200): 1–5.

SNI. 2008. "**How to test the specific gravity and water absorption of coarse aggregates SNI1969-2008."** *Indonesian National Standards Agency*, 20.

SNI 03-1968. 1990. **"Test Methods On the Analysis of Fine and Coarse Aggregate Sieves."** *Indonesian National Standards Agency*, 1–5.

SNI 03-1971-1990. 1990. **"Aggregate Moisture Testing Methods."** *National Standardization Agency* 27 (5): 6889.

SNI 03-4804-1998. 1998. "**Test Methods of Fill Weights and Air Cavities in Aggregates."** *Indonesian National Standardization Agency*, 1–6.

SNI 03-6827-2002. 2002. "**Testing Methods for the Early Binding Time of Portland Cement by Using Vicat Tools for Civil Works."** *Indonesian National Standardization Agency*, 6827.

SNI 15-2049-2004. 2004. **"Portland Cement."** *Indonesian National Standardization Agency*, 1–128.

SNI 1970. 2008. "**How to Test Specific Gravity and Water Absorption of Fine Aggregates."** *Indonesian National Standards Agency*, 7–18.

SNI 2816-2014. 2014. **"Test Methods of Organic Matter in Fine Aggregates for Concrete."** *Indonesian National Standards Agency*, 10.

SNI, 2847:2013. 2013. "**Structural Concrete Requirements for Building Buildings."** *Bandung: Indonesian Standardization Agency*, 1–265.

Studies, Programs, Civil Engineering, Faculty of Engineering, and Bina Darma University. 2019. **"EFFECT OF ADDITION OF SUPERPLASTICIZER FOR COMPRESSIVE STRENGTH ON NORMAL CONCRETE K350 USING PCC CEMENT."**

Tjokrodimuljo. (2007). **Concrete Technology. Publishing Bureau: Yogyakarta.** n.d. "."

W.Day, Ken. 2005. *Concret Mix Design, Quality Control And Specification Second Edition*. E&FN Spon.

W, Indratmoko Danang. 2007. **"Effect of Addition of Superplasticizer (Viscocrete-10) And Reduction Of Moisture Content On Concrete With Compressive Strength Of 20 MPa.**"