Pengaruh pemakaian semen tipe V terhadap ketahanan sulfat pada Self-Compacting Concrete (SCC)

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Abstrak

Serangan sulfat pada beton dalam jangka panjang dapat merusak ikatan antar material penyusun beton, sehingga mengurangi durabilitas beton. Salah satu teknologi praktis dalam pencegahan dampak serangan sulfat adalah penggunaan semen Portland tipe V. Selain itu, perkembangan teknologi beton berupa Self-Compacting Concrete (SCC) dapat meminimalisir jumlah void sehingga mengurangi difusi larutan sulfat. Tujuan dari penelitian ini adalah untuk mempelajari karakteristik SCC dengan semen Portland tipe V, dan mengetahui pengaruh serangan sulfat terhadap beton dengan semen Portland tipe V. Benda uji direndam pada air suling selama 28 hari, kemudian diperlakukan dengan beberapa variasi perendaman, yaitu menggunakan air suling, air laut, larutan magnesium sulfat 5%, dan perlakuan wetting-drying (rendam-angkat) pada larutan magnesium sulfat 5% selama 14 dan 28 hari. Peninjauan pengaruh sulfat terhadap beton dilakukan dengan pengujian kuat tekan, kuat tarik belah, kuat lentur, dan permeabilitas. Kekuatan tekan, tarik belah, dan lentur beton diukur pada umur ke-28, 42, dan 56 hari. Sementara permeabilitas diukur ketika beton berumur 42 hari. Hasil penelitian menunjukkan bahwa selama 28 hari, ketiga variasi perendaman menyebabkan penurunan kekuatan mekanis pada benda uji dibandingkan dengan benda uji yang direndam pada air suling. Akibat variasi perendaman air laut, presentase penurunan yang terjadi pada kekuatan tekan, tarik belah, dan tarik lentur masing-masing sebesar -7,23%, 3,37%, dan 1,68%. Sementara, akibat variasi perendaman larutan magnesium sulfat 5%, presentase penurunan pada kekuatan tekan, tarik belah, dan tarik lentur masing-masing sebesar -26,99%, -24,39%, dan 16,2%. Dan akibat perlakuan rendam-angkat pada larutan magnesium sulfat 5%, presentase penurunan pada kekuatan tekan, tarik belah, dan tarik lentur masing-masing sebesar -37,15%, -17,59%, dan 33,52%. Sementara, akibat perendaman dalam air laut, larutan magnesium sulfat, dan perlakuan rendam angkat pada magnesium sulfat, terjadi peningkatan penetrasi air pada uji permeabilitas, dengan presentase masing-masing sebesar -35,6%, 5,2%, dan 22,94%. Hasil yang didapat pada penelitian ini memerlukan penelitian lebih lanjut diakibatkan oleh kesalahan yang terjadi selama pembuatan benda uji.

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Sulfate attack on concrete in a long period of time breaks the bond between the former materials, so that it reduces durability of concrete. One of some practical technologies in mitigating the effect of sulfate attack is the use of type V Portland cement. Besides, the advancement of concrete technology, namely Self-Compacting Concrete (SCC) can reduce the diffusion of sulfate solution through the void because of its smaller amount of void. The objectives of this study are to examine the characteristic of SCC using type V Portland cement, and to study the effect of sulfate attack on type V Portland cement concrete. The concrete is treated with some methods of immersion: using tap water, sea water, 5% magnesium sulfate solution, and wetting-drying cycle on 5% magnesium sulfate solution during 14 and 28 days after being immersed during 28 days on tap water. Effect of sulfate attack on concrete reviewed by observing the compressive, splitting tensile, and flexural strength, also the permeability on each sample. The compressive, splitting tensile, and

flexural strength of concrete observed on the 28th, 42nd, and 56th day. While, the permeability observed only on the age of 42 days. The result of this study shows that the immersion of samples in those three variation of immersion during 28 days results in the reduction of mechanical strength relative to the samples immersed in tap water. The rates of reduction on compressive, splitting tensile, and flexural strength due to the immersion in sea water, consecutively, are -7,23%, 3,37%, and 1,68%. While, due to the immersion in 5% magnesium sulfate solution, the rates of reduction on compressive, splitting tensile, and flexural strength, consecutively, are -26,99%, -24,39%, and 16,2%. And The rates of reduction on compressive, splitting tensile, and flexural strength due to wetting-drying cycle on 5% magnesium sulfate solution, consecutively, are -37,15%, -17,59%, and 33,52%. Otherwise, the immersion in sea water, magnesium sulfate solution, and wetting-drying cycle on magnesium sulfate solution results in the increase of water penetration level on the permeability test, by the rate of -35,6%, 5,2%, and 22,94%. The result of this research needs a more advanced research, due to the errors happen in the making of the samples.