ABSTRACT

THE EFFECT OF BRACKET WATER SOAKING ON COMPRESSIVE STRENGTH, TENSILE STRENGTH, AND ITS PENETRATION

By

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Concrete is a type of construction that is widely used in various infrastructure, one of which is in water buildings. Concrete must withstand various conditions such as brackish water. Brackish water is an aggressive environment with chemical contents that can interfere with the compressive strength of concrete. The aim of this research is to determine the effect of immersion in brackish water in the actual environment on compressive strength, split tensile strength and penetration. Tests in this research were carried out on concrete aged 28, 56 and 90 days. 42 samples were used with a design compressive strength of 20.75 MPa. The data obtained were analyzed using the Dixon criteria according to ASTM E 178-02. The research results show that brackish water has a negative impact on the compressive strength and split tensile strength of concrete. The compressive strength values for protected concrete aged 28, 56, and 90 days are respectively 22,557 MPa, 24,350 MPa, and 25,843 MPa, while for concrete submerged in brackish water they are 20,977 MPa, 18,383 MPa, and 16,317 MPa respectively. The splitting tensile strength values for protected concrete aged 28, 56, and 90 days are respectively 6,797 MPa, 7,220 MPa, and 8,047 MPa, for concrete submerged in brackish water respectively 10,070 MPa, 7,097 MPa, and 6,377 MPa. The water penetration value according to DIN EN 12390-8:2009-07 is found to be 2.655 cm. This shows that the aggressive waterproof concrete is strong. The penetration values of water submerged in brackish water aged 28, 56, and 90 days are 2,833 cm, 3,300 cm, and 3,967 cm, respectively. Water penetration withGround Penetrating Radar (GPR) shows that the amplitude value gets weaker with soaking time, which indicates that water penetration is getting deeper and the concrete is experiencing degradation. Identification of water penetration using GPR frequency 1 GHz cannot determine in detail the depth of water entering the concrete.

Keywords: brackish water, compressive strength, concrete, penetration, tensile strength.

ABSTRAK

PENGARUH PERENDAMAN AIR PAYAU TERHADAP KUAT TEKAN, KUAT TARIK BELAH, DAN PENETRASINYA

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Beton merupakan jenis konstruksi yang banyak digunakan diberbagai infrastruktur salah satunya di bangunan air. Beton harus tahan terhadap berbagai kondisi seperti air payau. Air payau adalah lingkungan agresif dengan kandungan kimia yang dapat mengganggu kuat tekan beton. Tujuan dari penelitian ini adalah mengetahui pengaruh perendaman air payau pada lingkungan sebenarnya terhadap kuat tekan, kuat tarik belah, dan penetrasinya. Pengujian pada penelitian ini dilakukan pada beton umur 28, 56, dan 90 hari. Digunakan benda uji berjumlah 42 sampel dengan kuat tekan rencana 20,75 MPa. Data yang diperoleh dianalisis dengan kriteria dixon sesuai ASTM E 178-02. Hasil penelitian menunjukkan bahwa air payau berdampak negatif terhadap kuat tekan dan kuat tarik belah beton. Nilai kuat tekan beton terlindung umur 28, 56, dan 90 hari berturut-turut yaitu 22,557 MPa, 24,350 MPa, dan 25,843 Mpa, sedangkan untuk beton terendam air payau berturut-turut yaitu 20,977 MPa, 18,383 MPa, dan 16,317 MPa. Nilai kuat tarik belah beton terlindung umur 28, 56, dan 90 hari berturut-turut yaitu 6,797 MPa, 7,220 MPa, dan 8,047 Mpa, untuk beton terendam air payau berturut-turut yaitu 10,070 MPa, 7,097 MPa, dan 6,377 MPa. Nilai penetrasi air sesuai DIN EN 12390-8:2009-07 didapat sebesar 2,655 cm. Hal ini menunjukkan bahwa beton kedap air agresif kuat. Nilai penetrasi air terendam air payau umur 28, 56, dan 90 hari berturut-turut yaitu 2,833 cm, 3,300 cm, dan 3,967 cm. Penetrasi air dengan *Ground Penetrating Radar* (GPR) menunjukkan nilai amplitudo semakin melemah seiring waktu perendaman yang mengindikasikan penetrasi air semakin dalam dan beton mengalami degradasi. Identifikasi penetrasi air menggunakan GPR frekuensi 1 GHz tidak dapat menentukan secara detail kedalaman air yang masuk kedalam beton.

Kata kunci: air payau, beton, kuat tarik belah, kuat tekan, penetrasi.