ABSTRACT

THE INFLUENCE OF SEAWATER ON THE MECHANICAL PROPERTIES OF CONCRETE AND THE PHYSICAL PROPERTIES OF CONCRETE

By

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Concrete is one of the most commonly used building materials in infrastructure, including buildings in marine environments. This research aims to provide an overview of the influence of sea water on the mechanical properties of concrete and the physical properties of concrete. The research was carried out experimentally using the mix design method SNI 03 – 2834 – 2000. The mechanical properties tested were compressive strength, split tensile strength and the physical properties tested were concrete permeability. Three methods are used to determine the permeability of concrete, namely the DIN EN12390-8:2009-07 standard method, the natural method and the Gound Penetrating Radar (GPR). The total number of test objects was 42 samples, each test used 3 samples. The concrete is given a protected treatment and submerged in sea water. The results of research on the compressive strength of protected concrete aged 28, 56 and 90 days were respectively 22, 56 MPa, 24.35 MPa and 25.84 MPa, while submerged in sea water were respectively 22.27 MPa, 17.67 MPa and 16.10 MPa. Tests for split tensile strength of protected concrete at 28, 56 and 90 days were respectively 6.80 MPa, 7.22 MPa and 8.05 MPa, for concrete submerged in sea water respectively 8.89 MPa, 7.65 MPa and 7.23 MPa. The results of concrete permeability testing using the DIN EN12390-8:2009-07 standard method showed a permeability of 26.57 mm. This shows the concrete is watertight for strong aggressive environments. The permeability of concrete using the natural method at 28, 56 and 90 days was 27.7 mm, 35.0 mm and 40.7 mm, respectively. GPR results show that concrete submerged in sea water produces increasingly weakened amplitude values. This indicates that sea water penetration is increasing and the concrete is experiencing strength degradation. Sea water can reduce the compressive strength of concrete based on the soaking time.

Keywords: compressive strength, concrete, permeability, seawater, tensile strength, ,

ABSTRAK

PENGARUH AIR LAUT TERHADAP SIFAT MEKANIK BETON DAN SIFAT FISIK BETON

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Beton adalah salah satu bahan bangunan yang paling umum digunakan dalam infrastruktur termasuk bangunan yang ada dalam lingkungan laut. Penelitian ini bertujuan untuk mengetahui gambaran mengenai pengaruh air laut terhadap sifat mekanik beton dan sifat fisik beton. Penelitian dilakukan secara eksperimental dengan metode mix design SNI 03 – 2834 – 2000. Sifat mekanik yang diuji adalah kuat tekan, kuat tarik belah dan sifat fisik yang diuji adalah permeabilitas beton. Digunakan 3 metode untuk mengetahui permeabilitas beton yaitu metode standar DIN EN12390-8:2009-07, metode alami dan metode *Gound Penetrating Radar* (GPR). Jumlah semua benda uji sebanyak 42 sampel, setiap pengujian menggunakan 3 sampel. Beton diberikan perlakuan terlindung dan terendam air laut. Hasil penelitian kuat tekan beton terlindung umur 28, 56 dan 90 hari berturut – turut sebesar 22, 56 MPa, 24,35 MPa dan 25,84 MPa, sedangkan terendam air laut berturut -turut sebesar 22,27 MPa, 17,67 MPa dan 16,10 MPa. Pengujian kuat tarik belah beton terlindung pada umur 28, 56 dan 90 hari berturut – turut sebesar 6,80 MPa, 7,22 MPa dan 8,05 MPa, untuk beton terendam air laut berturut – turut sebesar 8,89 MPa, 7,65 MPa dan 7,23 MPa. Hasil pengujian permeabilitas beton metode standar DIN EN12390-8:2009-07 diperoleh permeabilitas sebesar 26,57 mm. Hal ini menunjukkan beton kedap air untuk lingkungan agresif kuat. Permeabilitas beton menggunakan metode alami pada umur 28, 56 dan 90 hari berturut – turut sebesar 27,7 mm, 35,0 mm dan 40,7 mm. Hasil GPR menunjukkan beton terendam air laut menghasilkan nilai amplitudo yang semakin melemah. Hal ini mengindikasikan penetrasi air laut yang semakin besar dan beton mengalami degedrasi kekuatan. Air laut dapat menurunkan kuat tekan beton berdasarkan lama perendaman.

Kata kunci : air laut, beton, kuat tarik belah, kuat tekan, permeabilitas