

# Studi Properti Mekanis Beton dengan Variasi Gradasi Bahan Limbah Karet Ban sebagai Pengganti Parsial Agregat Halus = Study of Mechanic Properties on Concrete with Gradation Variations of Rubber Tyre Waste as a Partial Replacement of Fine Aggregate

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## Abstrak

Penggunaan ban karet bekas sebagai substitusi agregat halus dalam beton akan membantu mengurangi jumlah limbah ban yang berakhir di tempat pembuangan akhir dan mengurangi masalah yang ditimbulkan akibat penumpukannya. Ban karet bekas menjadi material substitusi agregat halus dalam rencana campuran beton sebanyak 10% dari volumenya. Ban karet bekas dicacah menjadi 3 variasi ukuran agregat yakni ukuran saringan No.8 (2.36 mm) sampai No.30 (0.6 mm), No. 4 (4.75 mm) sampai No.8 (2.36 mm), dan No.4 (4.75 mm) sampai No.30 (0.6 mm). Ban karet bekas yang telah menjadi agregat dilakukan pra-perawatan dengan direndam 30 menit di dalam NaOH dengan konsentrasi 10%. Pengujian yang dilakukan untuk benda uji adalah slump test, uji kuat tekan dengan digital image correlation, ultrasonic pulse velocity test, dan uji kuat tarik belah. Studi ini meneliti mengenai properti mekanis seperti kuat tekan, pola kegagalan, displacement, daktilitas, stiffness, poisson ratio, modulus elastisitas, kuat tarik belah, dan cepat rambat gelombang. Beton dengan substitusi agregat karet ban dengan ukuran No.4 (4.75 mm) sampai No.30 (0.6 mm) memberikan nilai daktilitas dan poisson ratio yang lebih tinggi dibandingkan beton tanpa substitusi, menjadikan beton dapat berdeformasi secara lebih besar.

.....The utilization of used rubber tires as a substitute for fine aggregate in concrete will help to reduce the amount of tire waste that ends up in landfills and the problems caused by its accumulating number. Used rubber tires are used as a substitute for fine aggregate in the concrete mix plan for as much as 10% of its volume. Used rubber tires are cut into 3 variations of aggregate size, which are No. 8 (2.36 mm) to No. 30 (0.6 mm), No. 8 (2.36 mm) sieve. 4 (4.75 mm) to No. 8 (2.36 mm), and No. 4 (4.75 mm) to No. 30 (0.6 mm). Used rubber tires that have become aggregates are pre-treated by soaking them for 30 minutes in a 10% NaOH solution. The tests carried out for the test objects are slump test, compressive strength test with digital image correlation, ultrasonic pulse velocity test, and split tensile strength test. This study examines mechanical properties such as compressive strength, failure pattern, displacement, ductility, stiffness, poisson ratio, modulus of elasticity, split tensile strength, and propagation velocity. Crumb rubber concrete with sizes of rubber aggregate no. 4 (4.75 mm) to no. 30 (0.6 mm) gave higher ductility and poisson ratio values than concrete without substitution, making the concrete able to deform on a larger scale.