

ABSTRAK

Penelitian ini bertujuan untuk menganalisis pengaruh penambahan silica fume dengan variasi 0%, 3%, 5%, dan 7% serta superplasticizer jenis Naphthalene Sulfonate (SNF) 0,5% terhadap workability dan kuat tekan beton normal. Beton dirancang menggunakan metode ACI dan diuji slump serta kuat tekan pada umur 14 dan 28 hari. Hasil menunjukkan bahwa penambahan silica fume menurunkan nilai slump dari 90 mm menjadi 75 mm, namun seluruh variasi masih memenuhi rentang slump beton struktural menurut SNI 7656:2012.

Peningkatan kadar silica fume memperbaiki mikrostruktur beton melalui reaksi pozzolanik dan efek micro-filler, sehingga menghasilkan tren kenaikan kuat tekan pada setiap variasi. Nilai kuat tekan tertinggi diperoleh pada kadar 7% dengan nilai 25,08 MPa pada umur 28 hari. Analisis ANOVA menunjukkan perbedaan signifikan pada kuat tekan umur 14 hari antara beton 0% dan 7%, sementara pada umur 28 hari peningkatan tidak signifikan secara statistik namun tetap konsisten secara teknis.

Berdasarkan keseluruhan kinerja, kadar optimum silica fume ditetapkan pada 7% karena menghasilkan kuat tekan tertinggi sekaligus mempertahankan workability dalam batas standar. Penelitian ini menegaskan bahwa kombinasi silica fume 7% dan SNF 0,5% mampu meningkatkan kualitas beton normal secara efektif.

Kata kunci: Silica fume, Superplasticizer SNF, Workability, Kuat Tekan, Beton Normal.

ABSTRACT

This study aims to analyze the effect of adding silica fume at variations of 0%, 3%, 5%, and 7% and Naphthalene Sulfonate (SNF) superplasticizer at 0.5% on the workability and compressive strength of normal concrete. The concrete was designed using the ACI method and tested for slump and compressive strength at 14 and 28 days of age. The results show that the addition of silica fume reduced the slump value from 90 mm to 75 mm, but all variations still met the structural concrete slump range according to SNI 7656:2012.

Increasing the silica fume content improved the microstructure of concrete through pozzolanic reactions and micro-filler effects, resulting in an upward trend in compressive strength for each variation. The highest compressive strength value was obtained at a content of 7% with a value of 25.08 MPa at 28 days. ANOVA analysis showed a significant difference in compressive strength at 14 days between 0% and 7% concrete, while at 28 days the increase was not statistically significant but remained technically consistent.

Based on overall performance, the optimum silica fume content was determined to be 7% because it produced the highest compressive strength while maintaining workability within standard limits. This study confirms that the combination of 7% silica fume and 0.5% SNF can effectively improve the quality of normal concrete.

Keywords: Silica fume, Superplasticizer SNF, Workability, Compressive Strength, Normal Concrete.