

Creep Losses in Post-Tensioned Concrete Masonry

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Abstract:

Prestress losses in post-tensioned masonry can be caused by creep and shrinkage of the masonry, relaxation of the steel tendon, seating losses of the anchorage system, and elastic shortening of the wall at tendon release. Research performed at the University of Wyoming focused on creep losses under lower net compressive stresses likely to be used in prestressed masonry structures. Eight concrete masonry walls 8 in x 24 in x 6 ft (203 mm x 610 mm x 1.83 m) were loaded with compressive stress levels ranging from 50 psi to 250 psi (0.34 MPa to 1.72 MPa). The experimental work was conducted indoors but not in an environmental chamber and was thus subjected to changes in relative humidity and temperature. Total strain was measured periodically throughout the test period. Shrinkage strains were measured in unloaded control walls and subtracted from the total measured strain in the specimens to give creep strains. The creep data from this research are combined with data from previous research to give recommended values for calculating prestress losses due to creep. Current Masonry Standards Joint Committee requirements give a recommended specific creep of $2.5 \times 10^{-7}/\text{psi}$ ($3.6 \times 10^{-7}/\text{MPa}$). The data from this and previous research suggest that this value is too low and the recommended value is $13 \times 10^{-4}/\text{psi}$ ($1.9 \times 10^{-7}/\text{MPa}$) for calculating creep losses in prestressed concrete masonry.

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