

EVALUATION OF TIME DEPENDENT PRESTRESS LOSSES IN PRETENSIONED CONCRETE MEMBER WITH TOP AND BOTTOM TENDONS

Vadzim PARKHATS ^{a*}, Rafał KRZYWONÓ ^b

^a MSc; Silesian University of Technology, Faculty of Civil Engineering, Department of Structural Engineering, Akademicka 5, 44-100 Gliwice, Poland

*E-mail address: vadzim.parkhats@polsl.pl

^b PhD; Silesian University of Technology, Faculty of Civil Engineering, Department of Structural Engineering, Akademicka 5, 44-100 Gliwice, Poland

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Abstract

Prestress losses are usually calculated by bringing the tendons in the cross-section to the single resultant tendon. This solution is correct only for tendons concentrated in one part of the cross-section, while with their wider distribution, for example after the use of upper tendons, it may result in underestimation of losses in the lower tendons and overestimation in the upper tendons. The paper presents formulae to determine time dependent prestress losses separately for the top and bottom tendons of a pretensioned concrete member. Furthermore, variations of stress in the prestressing steel are analysed for two pretensioned concrete members to evaluate the possibility of using the equation (5.46) from the Eurocode 2 for the resultant tendon instead of the deduced formulae. The aim of this study is to show how great the error of estimated loss of prestressing force on the basis of several typical prestressed concrete sections can be.

Keywords: Creep; Prestress losses; Pretensioned concrete member; Relaxation; Shrinkage; Stress in prestressing reinforcement; Tendons.