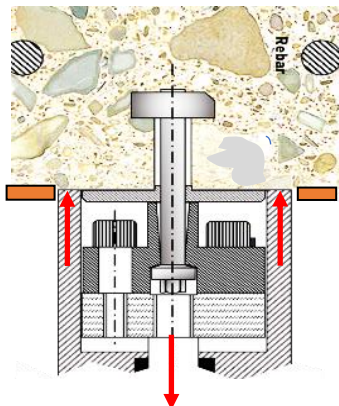
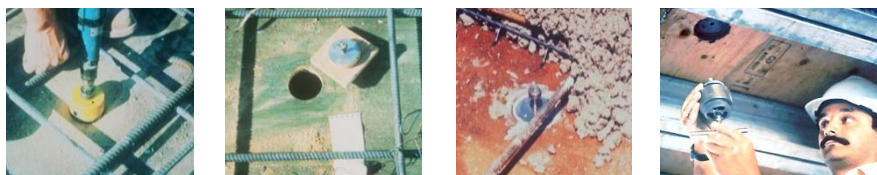


NDTitans in action

Case 4.6 Safe and early form stripping with LOK-TEST for strength, Canada



Not only for accelerating construction schedules, but also for safety, the LOK-TEST pullout system is used extensively for testing the strength of slabs during construction on high rise residential and office structures. The system is used in conjunction with optimized concrete mixes, by which a scheduled time of construction can be reduced, saving interest, costs on formworks, reshoring, winter heating and earlier rental¹⁾

In a 100 m³ slab pour 10 to 15 LOK-TEST inserts are installed equally distributed in the bottom of the slab as illustrated above through prepared port holes. Inserts can also be installed as floating inserts in the top, but the bottom installation is preferred due to simplicity.

At the time of testing a couple of inserts are tested, e.g. evaluated by maturity, and if meeting the expectations, the remaining inserts are tested. 10 inserts can be tested in about 1 hour.

The LOK-TEST pullout forces are converted to equivalent cylinder strength in MPa by means of a pre-established relationship matching the general correlation. The standard deviation is calculated, followed by calculation of the "Minimum in-place strength" as: Average Strength less a K-factor times the Standard Deviation. The "K" factor relates to the 10% fractile of the T-distribution.

If the "Minimum in-place strength" is higher than 75% of the f'_c , stripping / reshoring takes place, otherwise testing of remaining inserts is performed later, e.g. after another half-a-day, and the "Minimum in-place strength" re-calculated.

This procedure has been adhered to in many cases for safe and early loading of slabs in high rises as the one above (Scotia Plaza – Toronto, Canada) where earnings due to speeding up construction schedule was reported to be 1.5 M Dollars. Optimized concrete mixes were used, allowing forms to be removed as quickly as after 1.5 actual days, even in cold winter conditions. On the other hand, in the substructure, strength is not needed that quickly. Here e.g. fly-ash, Slag Cement, or other supplementary materials may be used in the mix, reducing the costs of the concrete mix.

On projects as reported in ²⁾ Trinity Square, the building officials allowed elimination of the usual mandatory standard cylinder tests.

The Canadian Standard CSA-A23.2-15C ³⁾ outlines in detail the testing procedures, and the calculations.

NDTitan Sal Fasullo is shown above performing the LOK-Testing

¹⁾Bickley, J.A. & Hindo, K.R.: "How to Build Faster for Less – The Role of In-Place Testing in Fast Track Construction", ACI, Spring Convention, San Francisco, USA, 1994

²⁾Bickley, J.A.: "Trinity Square: Commentary on concrete test date, Cement, Concrete, and Aggregate, CCAGDP, Vol 6, No.1, 1984, pp 28-32

³⁾Canadian Standard CSA-A23.2-15C "Evaluation of concrete strength in place using the pullout test"