

## NDTitans in action

### Case 4.5 Strength of an industrial floor measured by LOK-TEST before loading, timed by maturity

A 1000 m<sup>2</sup> industrial floor being constructed during cold weather conditions needed to be tested for strength prior to loading. The required strength before loading was 25 MPa.

Laboratory cylinder strength vs maturity curves had been developed by the ready-mixed concrete producer for different mixtures. The cylinders were well compacted and cured in water at 20° C and maturity was expressed as equivalent age at 20° C, M<sub>20</sub>.

Mixture C was selected for the project. Based on the strength-maturity curve the required strength should be obtained at an equivalent age, M<sub>20</sub>, of 3 days.

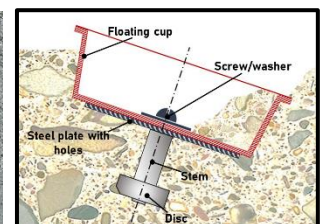
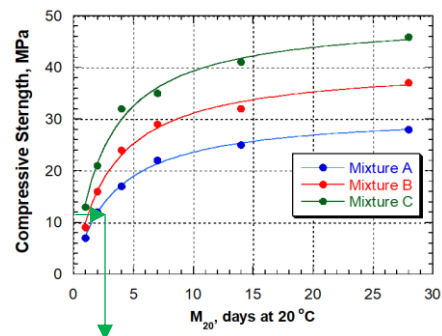
Concreting of the 150 mm thick industrial floor was conducted using well batched concrete, cast, consolidated properly, and covered with a plastic sheet right after finishing with insulation mats on top.

8 LOK-TEST inserts were installed in the top surface right after casting together with activated Coma-Meters, equally distributed throughout the floor.

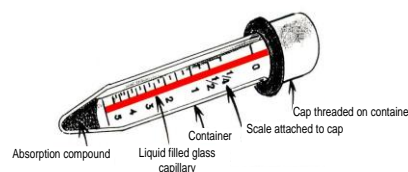
LOK-TEST was performed when the Coma-Meters showed minimum 3 M<sub>20</sub> days, after about 2 actual days. The LOK-TEST pullout forces were transformed to cylinder strength using the general correlation curve shown to the right.

| Test No. | COMA METER (M <sub>20</sub> ) | LOK-TEST Load F (kN)   | Cylinder Strength f <sub>cyl</sub> (MPa) |
|----------|-------------------------------|------------------------|--|
| 1        | 3.3                           | 24.0                   | 24.2                                     |
| 2        | 3.1                           | 23.8                   | 24.0                                     |
| 3        | 3.2                           | 23.9                   | 24.1                                     |
| 4        | 3.1                           | 22.8                   | 22.8                                     |
| 5        | 3.2                           | 24.4                   | 24.7                                     |
| 6        | 3.3                           | 25.0                   | 25.0                                     |
| 7        | 3.5                           | 26.0                   | 26.5                                     |
| 8        | 3.5                           | 26.9                   | 26.6                                     |
|          |                               | f <sub>cyl</sub> Avg = | <b>24.9 MPa</b>                          |
|          |                               | f <sub>cyl</sub> SD =  | <b>1.5 MPa</b>                           |

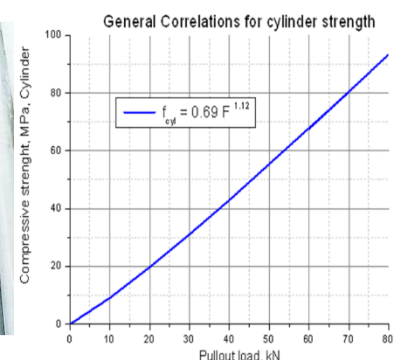
Therefore, the in-place strength had attained the required value of 25 MPa and loading of the floor was permitted. Performing the 8 LOK-TEST took less than 1 hour.



L-49 floating inserts being installed in the fresh concrete



Coma-Meter, maturity is registered automatically, to the left showing 1.3 M<sub>20</sub> days, obtained after 0.5 actual day



**NOTE:** Maturity gives the time and the temperature the concrete has been subjected to, nothing more. If a pre-established relationship to strength is available, maturity can show the approximate concrete compressive strength in-place provided the concrete mix is the same, the transportation, casting and not at least the curing on-site is close to the laboratory cylinders (which it never is). These factors may each have severe influence on the strength compared to the laboratory conditions, not at least if water is added to the mix. LOK-TEST will eliminate these uncertainties and give reliable strength estimates, in place