

“Permeability tests on sound and damaged areas of a shrinkage-compensating concrete industrial floor”

Roberto Torrent

Tests performed on site with the *Permea-T^oRR* (3rd November 2008)

Tests on three slabs on the ground of a large industrial floor in Buenos Aires, Argentina, namely:

Slab 1: Conventional Concrete - slide 6

Slab 2: Sound Shrinkage-compensating Concrete (ShCC)
– slide 7a

Slab 3: ShCC slab where repair work (due to delamination problems) had to be conducted. Readings taken in three zones:

- ▶ away from the repair – slide 7b
- ▶ close to the repair – slide 8
- ▶ directly on the repaired zone – slide 9

Results

1. The kT permeability of the conventional slab corresponds to Class PK2 (Low Permeability)

$$kT = 0.069 \cdot 10^{-16} \text{ m}^2$$

2. The kT permeability of the sound ShCC slabs also corresponds to Class PK2, but with values somewhat lower than for the conventional slab

$$kT = 0.019 \cdot 10^{-16} \text{ m}^2$$

$$kT = 0.037 \cdot 10^{-16} \text{ m}^2$$

3. The low kT values obtained in 1. and 2. are similar to results reported on laboratory specimens – slide 5, which gives testimony to the good quality of the concrete and to the excellent level of execution applied by the contractor

Results

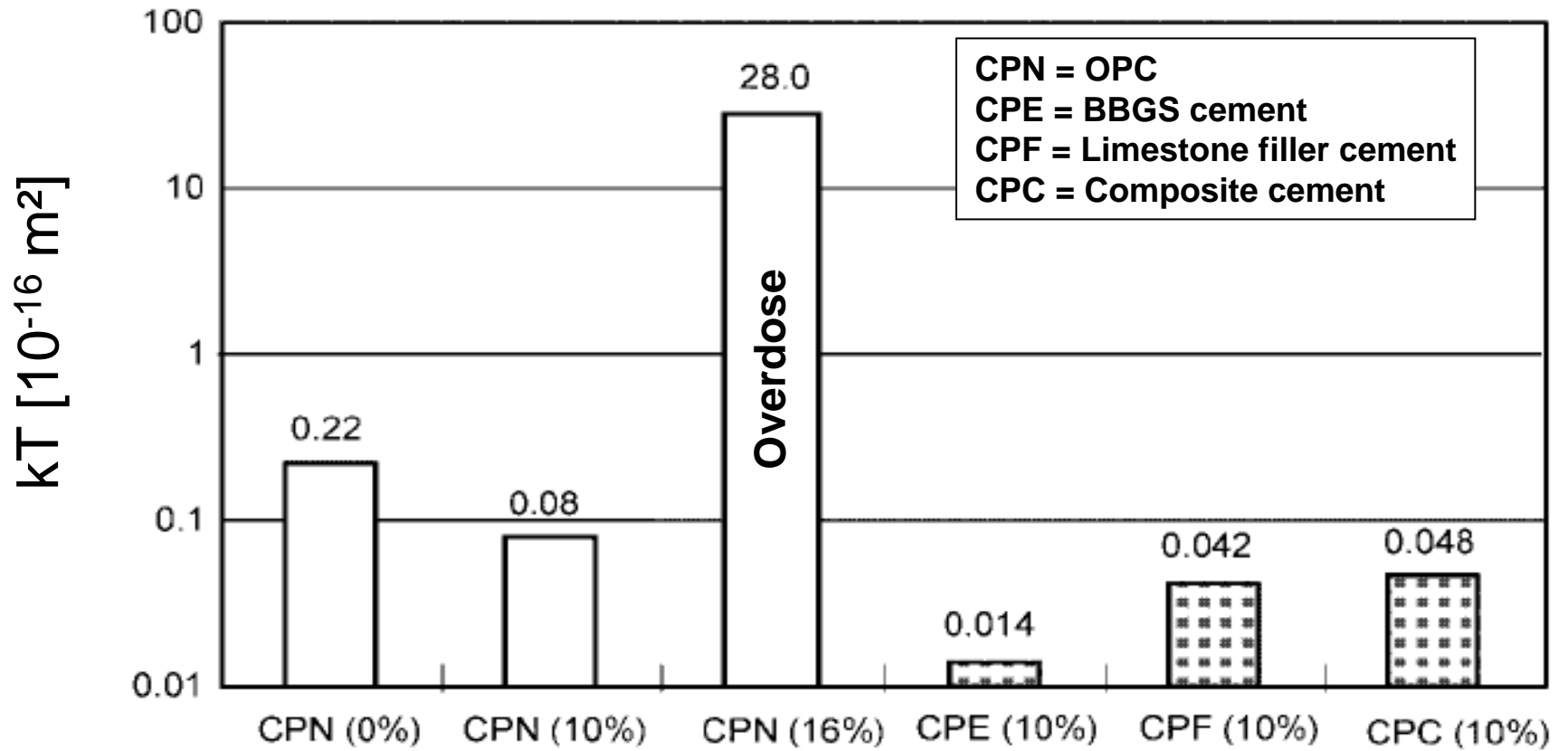
4. The kT permeability in the vicinity of the repaired zone is very high, corresponding to Class PK4 („High Permeability“). Alerted by the high kT , a close visual inspection of the area revealed cracking near the repair (unnoticed before the test).

$$kT = 7.1 \cdot 10^{-16} \text{ m}^2$$

5. The kT permeability measured directly on the repaired zone corresponds to Class PK3 („Moderate Permeability“), i.e. better than the surrounding cracked concrete, but still one Class higher than the originally sound concrete. This means that the repair work failed to restore the slab to a condition equivalent to the sound ShCC.

$$kT = 0.92 \cdot 10^{-16} \text{ m}^2$$

kT of conventional and ShC Concrete (laboratory specimens)



Cement Type (Dosis of expansive agent Expan-K)

Measured on specimens cured 14 days in moist room, followed by 90 days in dry room
(Reference 04-05 of Annotated Bibliography)

Conventional slab on the ground



$kT = 0.069 \cdot 10^{-16} \text{ m}^2$

Shrinkage Compensating Concrete (ShCC) sound slabs



$$kT = 0.037 \cdot 10^{-16} \text{ m}^2$$

$$kT = 0.019 \cdot 10^{-16} \text{ m}^2$$

ShCC slab, close to repaired zone



Repair

Cracks detected after test

$$kT = 7.1 \cdot 10^{-16} \text{ m}^2$$

ShCC slab, on repaired zone

Repair



$$kT = 0.92 \cdot 10^{-16} \text{ m}^2$$