



## SINTEF Structures and Concrete

Address: 7034 Trondheim  
Location: Rich Birkelands vei 3  
Telephone: +47 73 59 52 25  
Fax: +47 73 59 71 36

Enterprise no.: 948007029

# TEST REPORT

### CLIENT(S)

RADCON Scandinavia A/S  
Post box 1475  
0116 Oslo

### CLIENT'S REF

Sigurd Christiansen

### TYPE OF COMMISSION

Water Permeability of Concrete Impregnated with  
Radcon Sealing Agent

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## 1 INTRODUCTION

The report gives the results from water permeation experiments on concrete impregnated with Radcon sealing agent. The tests were carried out on untreated and impregnated concrete. The concrete quality was C-35 with water-to-cement ratio 0.6 and a compressive strength of 38 MPa after 28 days curing. This test report is essentially an english translation of test report 70021 dated 1994-03-15 (only minor lay-out changes).

## 2 TESTING

The water permeability coefficients from tests performed with water pressures of 10 kg/cm<sup>2</sup> (0.98 MPa) and 40 kg/cm<sup>2</sup> (3.92 MPa) are given for the concretes in Table 1.

The concrete samples were treated with Radcon sealing agent according to the procedure given by the supplier. Both the untreated and the impregnated concrete samples were water saturated under vacuum prior to the permeability test according to its procedure.

## 3 COMMENTS

According to the Norwegian code, NS 3420, 2nd edition, 1986, a concrete is water impermeable when the permeation coefficient is less than  $10 \cdot 10^{-12}$  m/s when the water pressure is 10 kg/cm<sup>2</sup>. Thus, the reference concrete is not rated water impermeable, while the concrete impregnated with Radcon sealing agent is. The Radcon sealing agent reduced the water permeability coefficient by about 70% at both water pressures according to the results in Table 1.

Table 1 Water permeability coefficients of untreated concrete (reference) and concrete impregnated with Radcon sealing agent.

Specimens	Permeability coefficient ( $10^{-12}$ m/s) at 10 kg/cm <sup>2</sup>	Permeability coefficient ( $10^{-12}$ m/s) at 40 kg/cm <sup>2</sup>
Reference concrete 1	12.0	4.73
Reference concrete 2	13.2	5.48
Reference concrete 3	28.9	broken
Reference, mean value	18±9	5.1±0.5
Impregnated concrete 1	4.77	1.49
Impregnated concrete 2	6.74	2.05
Impregnated concrete 3	3.37	0.94
Impregnated concrete, mean value	5.0±1.7	1.5±0.6

Note that the test performed with 40 kg/cm<sup>2</sup> is not in accordance with the procedure, since the specimens from the 10 kg/cm<sup>2</sup> test were used without taking them out of the test rig. However, the pressure was reduced to atmospheric for a period prior to the second test. This might have lead to problems with air in the system, even though every measure was taken to prevent this from happening. Still this may be why both untreated and impregnated concrete apparently became more impermeable at a higher water pressure. However, this potential problem was explain to the customer before the second experiment was carried out, and it was decided to perform it this way anyway.

Specimen no 3 of the untreated reference concrete cracked when the pressure was increased in the second part of the experiment. That its why there is no result from this sample at a 40 kg/cm<sup>2</sup> water head. The reason for the cracking might be that a pressure of 40 kg/cm<sup>2</sup> (or 3.98 MPa) is quite close to the expected tensile strength of the concrete itself.