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e della Ricerca Scientifica (art. 4 - Legge 46/82)
Laboratorio Qualificato ITALFERR - SIS t.a.v.
Laboratorio Qualificato CAVET

Chloride penetration in concrete with and without Mapelastic

MATERIALS:

- Cement: CEM II B/L 32-5 R
- Natural aggregates: sand (0-4.5 mm) and gravel (max. size: 20 mm)

CONCRETE MIXTURE:

- | | | |
|----------|--------------------------|----------------------|
| - Cement | : 280 Kg/m ³ | - w/c = 0.80 |
| - Water | : 225 Kg/m ³ | - slump = 240 mm |
| - Sand | : 725 Kg/m ³ | - 28-day compressive |
| - Gravel | : 1085 Kg/m ³ | strength=19 MPa |

PROCEDURE

After 7 days of wet curing at 20°C, some cube (150 mm) concrete specimens were treated with a Mapelastic coating (2 mm thick). Other cube concrete specimens were not treated with Mapelastic.

Treated and un-treated concrete specimens were air-cured up 28 days and then immersed in a 10% sodium chloride aqueous solution.

After 3, 7, 28, 45, and 60 days at 20°C the chloride penetration depth was measured according to the UNI 7928 standard test which is based on the use of silver nitrate and fluoresceine to determine the presence of chloride.

RESULTS

These are the concrete depths penetrated as a function of the immersion time in the 10% NaCl solution

Immersion time (days)	Chloride penetration (mm)	
	Without Mapelastic	With Mapeplastic
0	0	0
3	11	0
7	20	0
28	26	0
45	31	0.5
60	35	1.0

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Tests of CaCl_2 attack on concrete with and without Mapelastic

MATERIALS:

- Cement: CEM I 42-5 R
- Natural aggregates: sand (0-4.5 m) and gravel (max. size: 20 m)
- Superplasticizer: 40% aqueous solution of naphthalene-based chemical admixture

CONCRETE MIXTURE:

- Cement	: 460 Kg/m^3	- w/c = 0.40
- Water	: 185 Kg/m^3	- slump = 230 mm
- Sand	: 695 Kg/m^3	- 28-day compressive
- Gravel	: 1045 Kg/m^3	strength = 65 MPa
- Superplasticizer	: 4.6 Kg/m^3	

PROCEDURE

After 7 days of wet curing at 20°C some cube concrete specimens were treated with a Mapelastic coating (2 mm thick). Other cube concrete specimens were not treated with Mapelastic.

Treated and un-treated concrete specimens were air-cured at 20°C up 28 days and then immersed in a 30% calcium chloride aqueous solution at 40°C to accelerate the chloride penetration. After 14 days the temperature was changed from 40°C to 5°C in order to favour the damaging effect related to the formation $3\text{CaO}\cdot\text{CaCl}_2\cdot 15\text{H}_2\text{O}$ (Proceedings of the Third CANMET/ACI International Conference on Durability of Concrete, Nice, France, 1994: "Durability of Concrete Structures Exposed to CaCl_2 -Based De-Icing Salts" by M. Collepardi, L. Coppola and C. Pistolesi, pg 107-120).

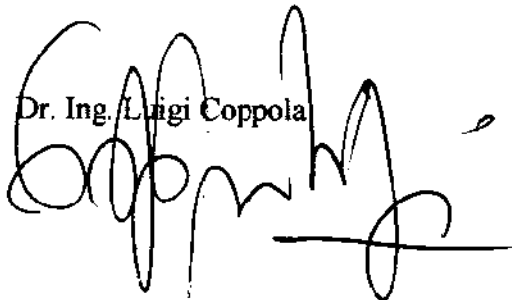
Compressive strength was measured after 14, 21, 42, and 60 days of immersion in the 30% CaCl_2 solution.

RESULTS

These are the compressive strength results as a function of the immersion time in the 30% CaCl_2 solution

Immersion time (days)	Compressive Strength (MPa)	
	Without Mapelastic	With Mapeplastic
0	65.0	65.5
14	60.3	67.0
21	53.4	66.4
42	47.2	67.5
60	38.3	67.4

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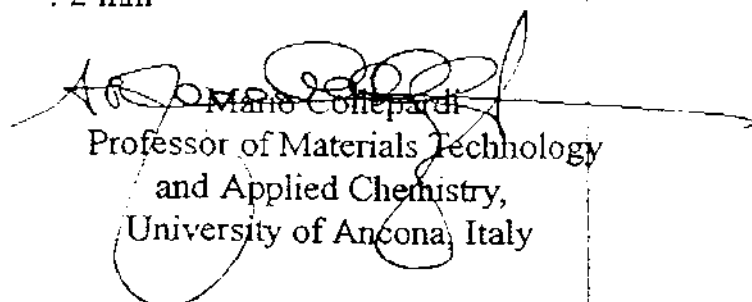
Engineering Concrete

CERTIFICATION

Product: **Mapelastic**

Enco Srl hereby certifies that Mapelastic produced by Mapei meets the following physical properties:

Bond Strength to concrete	: $\geq 0.8 \text{ N/mm}^2$	Debonding test
Modulus of Elasticity after 28 days (cured at + 23°C and 50% RH)	: $\leq 480 \text{ N/mm}^2$	According to French CSTB Method
Modulus of Elasticity after 7 days in air and 21 days in water and 1 day at 60°C	: $\leq 380 \text{ N/mm}^2$	According to French CSTB Method
Elongation at Break	: at 20°C and 95% U.R.	$\geq 24,0\%$ according to DIN 53504 Method.
	at 23°C and 50% U.R.	$\geq 34,0\%$ according to DIN 53504 Method
Resistance to Alkali	: Resistance to NaOH at pH 10: excellent (no change in the properties after 7 days at 20°C)	
Water Permeability	: No water penetration after 4 days at a pressure of 5 ATM according to DIN 1048 Method	
Crack Suppression	: $\geq 1 \text{ mm}$	
Hydrostatic Resistance	: $\geq 1 \text{ ATM}$	
Nominal Thickness	: 2 mm	


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