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Bellaterra : September 20, 2019
File No: : **19/20071-1785**
Petitioner's reference : **INDÚSTRIAS QUÍMICAS SATECMA, S.A.**
Avda. de la Fundición 69-75
P.I. Santa Ana
28522 - RIVAS VACIAMADRID (Madrid)

TESTS REPORT

SUBJECT REQUESTED:

Preparation of reference concrete with the addition of powder additive for tests, with the following references according to the Petitioner:

**REFERENCE CONCRETE
+ 0,8% ocw additive TECMA ADMIX CRYSTAL**

TESTS REQUESTED:

- ✓ Preparation of batches. UNE-EN 480-1:2015
- ✓ Consistency of fresh concrete, Abrams cone test. UNE-EN 12350-2:2009
- ✓ Air content in the fresh concrete, manometer method. UNE-EN 12350-7:2010
- ✓ Manufacturing and curing of test tubes. UNE-EN 12390-2:2009 + UNE-EN 12390-2:2009/1M:2015
- ✓ Compressive strength. UNE-EN 12390-3:2009 + UNE-EN 12390-3:2009/AC:2011
- ✓ Depth of penetration of water under pressure.
UNE-EN 12390-8:2009 and UNE-EN 12390-8:2009/1M:2011

TEST DATE: from 20/06/2019 to 23/08/2019

RESULTS : See attached pages.

Firmado digitalmente
por JUAN MARTINEZ
EGEA

Responsible for Construction Mat.
LGAI Technological Center, S.A.

Firmado digitalmente por
MANUEL LUQUE GAMA

Technical Manager
LGAI Technological Center, S.A.

The results specified in this document pertain only to the material received, LGAI and tested according to the instructions presented. LGAI Technological Center, S.A. is not responsible for the documentation provided by the petitioner.

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INDÚSTRIAS QUÍMICAS SATECMA, S.A.	REFERENCE CONCRETE + 0,8% ocw additive TECMA ADMIX CRYSTAL	

Preparation of batches. UNE-EN 480-1:2015MATERIAL USED FOR CONCRETE BATCHES

CEM I 52.5 R cement (350 kg/m³)

Limestone sand

Limestone aggregate

Drinking water from the network at our Lab (relation w/c=0,53)

Carboxylate superplasticizer based additive (2,0% ocw)

Powder additive TECMA ADMIX CRYTAL (0,8% ocw)

The batch have been kneaded in a 240 liter-capacity, vertical shaft concrete mixer, following the procedure described in Standard UNE-EN 480-1:2015.

1st: The inside of the tub is moistened with a damp cloth.

2nd: All of the dry limestones with the powder additive are added, followed by half the amount of water. The kneading is performed for 5 minutes and allowed to stand for another 2 minutes.

3rd: Cement is added and kneaded for 30 seconds.

4th: The rest of the water is added for 30 seconds and kneading continues for 5 minutes.

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RESULTS:

Consistency of fresh concrete, Abrams cone test. UNE-EN 12350-2:2009

Specimen	Consistency (mm)	Average	Consistency type
Cone 1	60	60 mm	symmetric
Cone 2	60		symmetric

Air content in the fresh concrete, manometer method. UNE-EN 12350-7:2010

Air content (%)	2,3%
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Compressive strength. UNE-EN 12390-3:2009 + UNE-EN 12390-3:2009/AC:2011

Increasing Tension is 0,5MPa/s.

Were tested in compression 6 cylindrical specimens of standard dimensions Ø150x300mm.

The specimens have been adjusted by the method of polishing.

Specimen	Test date	Age (days)	Height (mm)	Compressive strength (MPa)	
				Individual	Average
1	19/08/2019	60	299	42,3	41,5
2			297	41,5	
3			297	40,8	

All specimens have a satisfactory break.

According to EHE-2008, the relative path of an group of three specimens obtained by the difference between the highest and lowest result divided by the average of the three, taken from the same batch may not exceed 20%. In the case of two specimens, the relative distance may not exceed 13%.

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Depth of penetration of water under pressure.
UNE-EN 12390-8:2009 and UNE-EN 12390-8:2009/1M:2011

Start test: 20/08/2019 (at 61 days) at 08:00

Description of the specimens: cylindrical of dimensions Ø150x300mm in height.

Specimen (N°)	Application of water under pressure in relation to concreting: on the underside, in the opposite direction to the direction of concreting.				
	Ø (mm)	Height (mm)	Maximum depth (mm)		Mean depth (mm)
1	150	299	17	21	8
2	150	300	25		11
3	150	300	20		9

RESULTS OBTAINED			
Maximum penetration depth		Average penetration depth	
V. Maximum (Z ₉)	V. Average (Z _m)	V. Maximum (T ₉)	V. Average (T _m)
25 mm	21 mm	11 mm	9 mm

Quality Assurance Service

Applus+, ensures that this work has been done within the requirements of our Quality System and Sustainability, having fulfilled the contractual and legal regulations.

As part of our improvement program, please let us pass on any comments they consider appropriate, contact the person responsible for signing that letter, or the Director of Quality of Applus+, at: satisfaccion.cliente@applus.com