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1. drawing up

Test report

for

frost resistance

of

clay roofing tiles for discontinuous laying

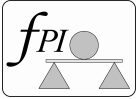
according to EN 539-2
(test method B)

Customer: TERREAL
Site de Colomiers
11 route de Pibrac
F-31770 Colomiers

Name of manufacturer: Tuilerie de St. Martin
Country of production: France

Order no.: 09021
Date of order: 06 February 2009
Date of report: 29. April 2009
Your order no.: 3000210616

Interlocking tile Longuedoc DCL
(Tuile à emboîtement Longuedoc DCL)
colour : rouge bourgogne



1. General Informations:

Date of receipt of the sample: 02. March 2009
Number of specimens: 35
Date of production: look table 1
Date of the test: 02. March – 22. April.2009

2. Order

06 February 2009 TERREAL Site de Colomiers, 11 route de Pibrac, F-31770 Colomiers engaged the Research and Testing Institute for Non-metallic Minerals Karlsruhe e.V. to test frost resistance of the delivered sample according to EN 539-2 (test method B).

3. Tests

Test for frost resistance according to EN 539-2 (test method B, procedure no. 2)

Test for waterabsorption at atmospheric pressure according to EN 539-2

Test for waterabsorption after conditioning in sprinkling system and immersion in water according to EN 539-2

4. Results

- The evaluation of the test results can be found on page 5 of this test report.
- All tiles have had a crack along the ground of the left side rib (surface) before start of the test.

Table 1: Marking of specimens

specimen no.	Marking ((imprinted)	
	underside	surface
1	15; NF CE; W; LANGUEDOC DCL 1DL TERREAL; F-11400 STMARTIN LALANDE	BM 040209; IIIIII
2	NF CE; W; LANGUEDOC DCL 1DL TERREAL; F-11400 STMARTIN LALANDE	BM 040209; IIIIII
3	NF CE; W; LANGUEDOC DCL 1DL TERREAL; F-11400 STMARTIN LALANDE	BM 040209; IIIIII
4	11; NF CE; W; LANGUEDOC DCL 1DL TERREAL; F-11400 STMARTIN LALANDE	BM 040209; IIIIII
5	28; NF CE; W; LANGUEDOC DCL 1DL TERREAL; F-11400 STMARTIN LALANDE	BM 040209; IIIIII
6	NF CE; W; LANGUEDOC DCL 1DL TERREAL; F-11400 STMARTIN LALANDE	BM 050209; IIIIII
7	17; NF CE; W; LANGUEDOC DCL 1DL TERREAL; F-11400 STMARTIN LALANDE	BM 040209; IIIIII
8	20; NF CE; W; LANGUEDOC DCL 1DL TERREAL; F-11400 STMARTIN LALANDE	BM 040209; IIIIII
9	15; NF CE; W; LANGUEDOC DCL 1DL TERREAL; F-11400 STMARTIN LALANDE	BM 050209; IIIIII
10	11; NF CE; W; LANGUEDOC DCL 1DL TERREAL; F-11400 STMARTIN LALANDE	BM 040209; IIIIII
11	NF CE; W; LANGUEDOC DCL 1DL TERREAL; F-11400 STMARTIN LALANDE	BM 040209; IIIIII
12	NF CE; W; LANGUEDOC DCL 1DL TERREAL; F-11400 STMARTIN LALANDE	BM 040209; IIIIII
13	10; NF CE; W; LANGUEDOC DCL 1DL TERREAL; F-11400 STMARTIN LALANDE	BM 040209; IIIIII
14	NF CE; W; LANGUEDOC DCL 1DL TERREAL; F-11400 STMARTIN LALANDE	BM 040209; IIIIII
15	21; NF CE; W; LANGUEDOC DCL 1DL TERREAL; F-11400 STMARTIN LALANDE	BM 040209; IIIIII
16	10; NF CE; W; LANGUEDOC DCL 1DL TERREAL; F-11400 STMARTIN LALANDE	BM 040209; IIIIII
17	10; NF CE; W; LANGUEDOC DCL 1DL TERREAL; F-11400 STMARTIN LALANDE	BM 040209; IIIIII
18	20; NF CE; W; LANGUEDOC DCL 1DL TERREAL; F-11400 STMARTIN LALANDE	BM 040209; IIIIII
19	20; NF CE; W; LANGUEDOC DCL 1DL TERREAL; F-11400 STMARTIN LALANDE	BM 040209; IIIIII
20	31; NF CE; W; LANGUEDOC DCL 1DL TERREAL; F-11400 STMARTIN LALANDE	BM 050209; IIIIII
21	2; NF CE; W; LANGUEDOC DCL 1DL TERREAL; F-11400 STMARTIN LALANDE	BM 040209; IIIIII
22	15; NF CE; W; LANGUEDOC DCL 1DL TERREAL; F-11400 STMARTIN LALANDE	BM 050209; IIIIII
23	20; NF CE; W; LANGUEDOC DCL 1DL TERREAL; F-11400 STMARTIN LALANDE	BM 040209; IIIIII
24	NF CE; W; LANGUEDOC DCL 1DL TERREAL; F-11400 STMARTIN LALANDE	BM 040209; IIIIII
25	28; NF CE; W; LANGUEDOC DCL 1DL TERREAL; F-11400 STMARTIN LALANDE	BM 040209; IIIIII
26	30; NF CE; W; LANGUEDOC DCL 1DL TERREAL; F-11400 STMARTIN LALANDE	BM 050209; IIIIII
27	24; NF CE; W; LANGUEDOC DCL 1DL TERREAL; F-11400 STMARTIN LALANDE	BM 050209; IIIIII
28	31; NF CE; W; LANGUEDOC DCL 1DL TERREAL; F-11400 STMARTIN LALANDE	BM 040209; IIIIII
29	20; NF CE; W; LANGUEDOC DCL 1DL TERREAL; F-11400 STMARTIN LALANDE	BM 040209; IIIIII
30	NF CE; W; LANGUEDOC DCL 1DL TERREAL; F-11400 STMARTIN LALANDE	BM 040209; IIIIII

Table 2a: Preselection of specimen by water absorption and preliminary treatment for the test for frost resistance according to EN 539 - 2 / test method B

specimen no.	dry mass m_{tr} [g]	water absorption at atmospheric pressure			specimen for freeze/thaw test Nr.	waterabsorption after conditioning in sprinkling system and immersion in water		
		wet mass m_u [g]	W_u			$W_{u,R}$		
			[g]	[%]		m_w [g]	[g]	[%]
1	4879	5231	352	7,21				
2	4999	5366	367	7,34				
3	5007	5373	366	7,31				
4	4959	5325	366	7,38	4	5345	386	7,78
5	5019	5387	368	7,33				
6	5052	5443	391	7,74				
7	5002	5368	366	7,32				
8	4973	5321	348	7,00	8	5350	377	7,58
9	4876	5220	344	7,05	9	5243	367	7,53
10	5009	5409	400	7,99	10	5431	422	8,42
11	4998	5358	360	7,20				
12	4952	5313	361	7,29				
13	4975	5368	393	7,90	13	5389	414	8,32
14	4995	5355	360	7,21				
15	4924	5283	359	7,29				
16	4928	5285	357	7,24				
17	4963	5351	388	7,82				
18	4983	5371	388	7,79				
19	5012	5402	390	7,78				
20	4955	5342	387	7,81				
21	5018	5382	364	7,25				
22	4887	5234	347	7,10				
23	4964	5350	386	7,78				
24	5019	5389	370	7,37				
25	5027	5398	371	7,38				
26	5007	5396	389	7,77				
27	4958	5344	386	7,79				
28	4870	5219	349	7,17				
29	4974	5342	368	7,40	29	5361	387	7,78
30	5013	5382	369	7,36				

W_u (min) 7,00
 W_u (max) 7,99
 W_u (average) 7,45

Table 2b: Examination of the test pieces before, each period of 50 cycles and upon completion of the test of 150 freeze/thaw cycles (according to EN 539-2 – test method B)

specimen no.	number of cycles	damage no.	frost damage constituting failure	damage discovered by naked eye
4	50	-	-	no damage
	100	-	-	no damage
	150	-	-	no damage
8	50	-	-	no damage
	100	-	-	no damage
	150	-	-	no damage
9	50	-	-	no damage
	100	-	-	no damage
	150	-	-	no damage
10	50	-	-	no damage
	100	-	-	no damage
	150	-	-	no damage
13	50	-	-	no damage
	100	-	-	no damage
	150	-	-	no damage
29	50	-	-	no damage
	100	-	-	no damage
	150	-	-	no damage

5. Evaluation of the test results:

The clay roofing tiles for discontinuous laying are able to meet the demands of EN 539-2 – test method B.

Research and Testing Institute
for Non-metallic Minerals Karlsruhe e. V.

Inspector



Dipl.-Ing. W. Rickelhoff
Head of the institute

R. Hoppe

Test for frost resistance according to EN 539-2 (test method B, procedure no. 2)

Condition of the specimen before
test for frost resistance

underside of the specimen



surface of the specimen



**Test for frost resistance according to EN 539-2
(test method B, procedure no. 2)**

Specimen no. 4

Condition of the specimen before and after
test for frost resistance

underside of the specimen



surface of the specimen



**Test for frost resistance according to EN 539-2
(test method B, procedure no. 2)**

Specimen no. 8

Condition of the specimen before and after
test for frost resistance

underside of the specimen



surface of the specimen



**Test for frost resistance according to EN 539-2
(test method B, procedure no. 2)**

Specimen no. 9

Condition of the specimen before and after
test for frost resistance

underside of the specimen



surface of the specimen



**Test for frost resistance according to EN 539-2
(test method B, procedure no. 2)**

Specimen no. 10

Condition of the specimen before and after
test for frost resistance

underside of the specimen



surface of the specimen



**Test for frost resistance according to EN 539-2
(test method B, procedure no. 2)**

Specimen no. 13

Condition of the specimen before and after
test for frost resistance

underside of the specimen



surface of the specimen



**Test for frost resistance according to EN 539-2
(test method B, procedure no. 2)**

Specimen no. 29

Condition of the specimen before and after
test for frost resistance

underside of the specimen



surface of the specimen

