

# TEST REPORT

**Applicant:**

**FAZENDA CONTAGEM, S/N  
ZONA RURAL  
PAPAGAIOS - MINAS GERAIS  
CEP 35669-000  
BRESIL**

**Date of order :**

October 30th, 2013

**Subject :**

Test following Annex ZA.1 of the standard NF EN 1341.  
(Slabs of natural stone for external paving)

**Reference documents :**

- Standard NF EN 1341 (February 2003)
- Standard NF EN 12371 (May 2003)
- Standard NF EN 12372 (March 2007)



### 3. IDENTIFICATION OF SAMPLES AND TESTS LIST

Both identification of the taken products and realized tests are set up in table 2.

| Applicant reference | L.N.E. Références        | Realized Tests   | Standards                      |
|---------------------|--------------------------|--|--------------------------------|
|                     | P1A603ACE-F<br>1 to 10   | Flexural strength (lower expected value)                       | NF EN 1341 §4.3<br>NF EN 12372 |
|                     | P1A603ACE-GD<br>1 to 10  | Flexural strength (initial)                                    | NF EN 1341 §4.2<br>NF EN 12372 |
|                     | P1A603ACE-GD<br>11 to 20 | Freeze-thaw resistance – Flexural strength (after freeze-thaw) | NF EN 1341 §4.2<br>NF EN 12372 |
|                     | P1A603ACE-U<br>1 to 10   | Abrasion resistance  | NF EN 1341 §4.4<br>Annex C     |
|                     | P1A603ACE-D<br>1 to 10   | Slip resistance  | NF EN 1341 §4.5<br>Annex D     |

Table 2 : **Samples identification and realized tests following NF EN 1341**

## 4. TESTS

### 4.1. PROCEDURES

The tests included in this report have been realized according to the aforesaid standards, as shown in table 2.

### 4.2. RESULTS

The tests have been realized from February 13<sup>th</sup> to July 11<sup>th</sup> 2014.

The results of measurements are summarized in the boards below, as shown in the following pages.

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**4.2.1. Flexural strength (lower expected value)**

| Samples references | Thickness adjacent to fracture plane (mm) | Width adjacent to fracture plane (mm) | Distance between supports (mm) | Breaking strength (N) | Flexural resistance (MPa) | Average (MPa) | Standard deviation (MPa) | Lower expected value (MPa) |
|--------------------|---|---------------------------------------|--------------------------------|-----------------------|---------------------------|---------------|--------------------------|----------------------------|
| P1A603ACE-F1       | 51.4                                      | 50.3                                  | 258.1                          | 21404                 | 61.7                      | 56            | 8                        | 40                         |
| P1A603ACE-F2       | 51.6                                      | 50.4                                  | 259.6                          | 19999                 | 57.3                      |               |                          |                            |
| P1A603ACE-F3       | 49.1                                      | 50.4                                  | 245.5                          | 13149                 | 39.9                      |               |                          |                            |
| P1A603ACE-F4       | 51.8                                      | 50.2                                  | 261.5                          | 20404                 | 58.3                      |               |                          |                            |
| P1A603ACE-F5       | 51.5                                      | 50.2                                  | 255.5                          | 21318                 | 62.2                      |               |                          |                            |
| P1A603ACE-F6       | 51.3                                      | 50.2                                  | 258.9                          | 18631                 | 53.6                      |               |                          |                            |
| P1A603ACE-F7       | 52.0                                      | 50.3                                  | 259.2                          | 22964                 | 65.9                      |               |                          |                            |
| P1A603ACE-F8       | 51.8                                      | 50.4                                  | 259.4                          | 16624                 | 47.7                      |               |                          |                            |
| P1A603ACE-F9       | 51.5                                      | 50.3                                  | 258.0                          | 19541                 | 56.6                      |               |                          |                            |
| P1A603ACE-F10      | 51.7                                      | 50.4                                  | 259.7                          | 18449                 | 52.8                      |               |                          |                            |

Table 3 : Flexural tests results-lower expected value - (NF EN 1341 § 4.3) - (NF EN 12372)

Comment 1 :

The strength was perpendicularly applied to planes of anisotropy (the surface finish of the sample was raw).

Comment 2 :

Fracture plane located in more than 15% of the distance of the supporting rollers for the references : P1A603ACE-F2 to P1A603ACE-F3 - P1A603ACE-F8 to P1A603ACE-F10.

Comments 3 :

For the reference P1A603ACE-F2 : at the middle-thickness, fracture along a layering plane (cleavage), splitting the sample into two different parts on half of the sample.

For the reference P1A603ACE-F3 : in two thirds of the thickness, fracture along a layering plane (cleavage), splitting the sample into two different parts (on both halves of the sample).

For the references P1A603ACE-F8 and P1A603ACE-F10 : in the third of the thickness, fracture along a layering plane (cleavage), splitting the sample into two different parts on half of the sample.

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## 4.2.2. Flexural strength (initial value before freeze/thaw)

| Samples references | Thickness adjacent to fracture plane (mm) | Width adjacent to fracture plane (mm) | Distance between supports (mm) | Breaking strength (N) | Flexural resistance (MPa) | Average (MPa) | Standard deviation (MPa) |
|--------------------|---|---------------------------------------|--------------------------------|-----------------------|---------------------------|---------------|--------------------------|
| P1A603ACE-GD1      | 51.7                                      | 50.7                                  | 258.0                          | 12301                 | 35.4                      | 27            | 9                        |
| P1A603ACE-GD2      | 51.7                                      | 50.5                                  | 258.5                          | 10596                 | 30.6                      |               |                          |
| P1A603ACE-GD3      | 51.7                                      | 50.4                                  | 258.3                          | 6870                  | 19.8                      |               |                          |
| P1A603ACE-GD4      | 49.6                                      | 50.5                                  | 246.8                          | 6465                  | 19.5                      |               |                          |
| P1A603ACE-GD5      | 49.3                                      | 50.5                                  | 246.8                          | 6064                  | 18.3                      |               |                          |
| P1A603ACE-GD6      | 52.2                                      | 50.3                                  | 259.0                          | 9385                  | 27.0                      |               |                          |
| P1A603ACE-GD7      | 51.0                                      | 50.7                                  | 255.9                          | 6380                  | 18.6                      |               |                          |
| P1A603ACE-GD8      | 51.5                                      | 50.3                                  | 257.5                          | 10754                 | 31.1                      |               |                          |
| P1A603ACE-GD9      | 51.5                                      | 50.6                                  | 257.1                          | 7848                  | 22.7                      |               |                          |
| P1A603ACE-GD10     | 52.2                                      | 50.3                                  | 259.2                          | 16625                 | 47.6                      |               |                          |

Table 4 : Flexural tests results before freeze - (NF EN 1341 §4.2) - (NF EN 12372)

## Comment 1 :

The strength was perpendicularly applied to planes of anisotropy (the surface finish was treated for the samples P1A603ACE-GD1, P1A603ACE-GD2 and P1A603ACE-GD4 and the surface finish was raw for the others).

## Comment 2 :

Fracture plane located in more than 15% of the distance of the supporting rollers for all the references.

## Comments 3 :

For the references P1A603ACE-GD1 - P1A603ACE-GD2 - P1A603ACE-GD10 in the third of the thickness, fracture along a layering plane (cleavage), splitting the sample into two different parts (on both halves of the sample).

For the references P1A603ACE-GD3 - P1A603ACE-GD7 - P1A603ACE-GD8 and P1A603ACE-GD9 : in two thirds of the thickness, fracture along a layering plane (cleavage), splitting the sample into two different parts (on both halves of the sample).

For the reference P1A603ACE-GD4 : in the third of the thickness, fracture along a layering plane (cleavage), splitting the sample into two different parts (on both halves of the sample), then, in two thirds of the thickness, fracture along a layering plane (cleavage), splitting the sample into two different parts on half of the sample.

For the reference P1A603ACE-GD5 : in two thirds of the thickness, fracture along a layering plane (cleavage), splitting the sample into two different parts on half of the sample.

For the reference P1A603ACE-GD6 : in three quarters of the thickness, fracture along a layering plane (cleavage), splitting the sample into two different parts on half of the sample.

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## 4.2.3. Flexural strength (initial value after freeze/thaw))

| Samples references | Thickness adjacent to fracture plane (mm) | Width adjacent to fracture plane (mm) | Distance between supports (mm) | Breaking strength (N) | Flexural resistance (MPa) | Average (MPa) | Standard deviation (MPa) |
|--------------------|---|---------------------------------------|--------------------------------|-----------------------|---------------------------|---------------|--------------------------|
| P1A603ACE-GD11     | 51.6                                      | 50.1                                  | 254.7                          | 6203                  | 18.2                      | 20            | 4                        |
| P1A603ACE-GD12     | 52.0                                      | 50.3                                  | 257.5                          | 5672                  | 16.4                      |               |                          |
| P1A603ACE-GD13     | 51.5                                      | 50.3                                  | 262.8                          | 6779                  | 19.3                      |               |                          |
| P1A603ACE-GD14     | 51.3                                      | 50.3                                  | 256.5                          | 10511                 | 30.5                      |               |                          |
| P1A603ACE-GD15     | 51.6                                      | 50.1                                  | 256.3                          | 7482                  | 21.7                      |               |                          |
| P1A603ACE-GD16     | 52.2                                      | 50.4                                  | 263.0                          | 5937                  | 16.8                      |               |                          |
| P1A603ACE-GD17     | 51.9                                      | 50.3                                  | 257.8                          | 6100                  | 17.7                      |               |                          |
| P1A603ACE-GD18     | 51.8                                      | 50.3                                  | 260.2                          | 5476                  | 15.7                      |               |                          |
| P1A603ACE-GD19     | 52.0                                      | 50.3                                  | 254.3                          | 7235                  | 21.1                      |               |                          |
| P1A603ACE-GD20     | 52.2                                      | 50.2                                  | 261.0                          | 7274                  | 20.8                      |               |                          |

Table 5 : Flexural resistance tests results after freeze - (NF EN 1341 §4.2) - (NF EN 12371) - (NF EN 12372)

## Comment 1 :

After freeze-thaw test, the specimens : P1A603ACE-GD11 - P1A603ACE-GD16 - P1A603ACE-GD17 - P1A603ACE-GD19, show a fracture along a layering plane (cleavage) splitting the sample into two different parts.

The six remaining specimens, after freeze-thaw test, show an incipient fracture of a layering plane (cleavage).

## Comment 2 :

The strength was perpendicularly applied to planes of anisotropy (the surface finish of the sample was raw).

## Comment 3 :

Fracture plane located in more than 15% of the distance of the supporting rollers for all the references.

## Comment 4 :

For all the references, numerous fractures along diverse layering planes (cleavages) on half or both halves of the sample.

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**4.2.4 Abrasion resistance**

| Samples references | Length of the corrected print (mm) |
|--------------------|------------------------------------|
| P1A603ACE-U1       | 27.0                               |
| P1A603ACE-U2       | 27.0                               |
| P1A603ACE-U3       | 27.0                               |
| P1A603ACE-U4       | 24.0                               |
| P1A603ACE-U5       | 27.0                               |
| P1A603ACE-U6       | 27.0                               |

Table 6 : **Abrasion resistance tests results - (NF EN 1341 §4.4)**

Comment : - Calibration factor  
 - Given the size of the sample, a single print was realized.

**4.2.5 Slip/Skid resistance**

| Samples references | Results sense 1 and after 180°rotation | USRV Value |
|--------------------|--|------------|
| P1A603ACE-D1       | 52                                     | 52         |
| P1A603ACE-D2       | 54                                     |            |
| P1A603ACE-D3       | 52                                     |            |
| P1A603ACE-D4       | 53                                     |            |
| P1A603ACE-D5       | 52                                     |            |
| P1A603ACE-D6       | 52                                     |            |

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**1. SUBJECT OF THE DOCUMENT**

The present document represents a summary of the tests results made on natural stone slabs samples sent by the applicant.

The commercial references and general characteristics (concerning natural stone slabs samples) given by the applicant, are noted in table1.

**2. SAMPLES RECEIVED**

The LNE received January 28th, 2014, 30 prisms about 50\*50\*300 mm, 7 plates 138\*90\*10 mm and 6 plates about 100\*70\*10 mm.

|   |                   |
|---|-------------------|
| Petrographic name of the stone                    | Slate schist      |
|   |                   |
| Country and place of extraction                   | Brésil - Contagem |
|   |                   |
| Name of the person which carried out the sampling |                   |

Table 1: **Commercial reference and general characteristics**

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5. SUMMARY TABLE

| Commercial reference | Flexural resistance minimal value expected (MPa) | Flexural resistance before freeze (MPa) | Flexural resistance after freeze (MPa) | Abrasion resistance (mm) | Slip resistance (USRV) |
|----------------------|--|---|--|--------------------------|------------------------|
|                      | 40   | 27                                      | 20                                     | 26.5                     | 52                     |

Table 8 : Results summary

Trappes, July 28th, 2014

Le Responsable de l'Essai  
*Test Officer*



Jean-Pierre KAMINSKI

The results which are quoted are only applicable to the sample, the product or material submitted to LNE and which is fully described in the document.