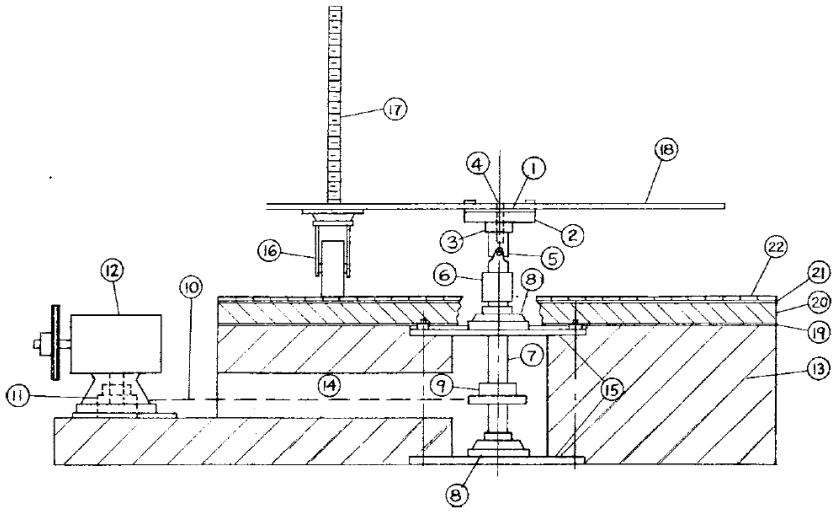
Fiorano Modenese, 24.01.2014

**OBJECT: Laminam 5 – Robinson test (ASTM C627)**

The Robinson test is an American standard (ASTM C627) for predicting a floor's performance under several different loads, in real-world applications. The test allows to identify the final destination of the product according to the performances of the laid floor.
This simple yet effective test is considered as the most common, strict and widely accepted way to quick forecast the performance of installed tile floors.

*Test Apparatus and interpretation of the results*
The Robinson test consists of a three-wheel cart that rotates about its center on the top a sample section of a tile floor (consisting of screed, adhesive, tiles and grouting). The cart, a ½" thick hot-rolled steel plate, is in the shape of an equilateral triangle and has a swivel caster wheel on each corner. The three wheels are equally spaced in a circle 15 inches from the cart's center. Above each wheel is a rod along which weights can be stacked. A ¾-horse power motor drives the assembly and the cart rotates at a rate of 15 revolution per minute.



1. Internal Gear
2. Clamp
3. Spur Gear
4. Shaft
5. Universal
6. Threaded Coupling
7. Drive Shaft
8. Bearing
9. Sprocket
10. Drive Chain
11. Sprocket
12. Reducer
13. Foundation
14. Tunnel for Drive
15. Bearing Plates (2)
16. Swivel Caster Wheels (3)
17. Threaded Rods (3)
18. Carriage
19. Plaster Bedding
20. Concrete Base Panel
21. Bond Coat
22. Ceramic Tile

**FIG. 1 Floor Tile Installations Systems Tester (Not to Scale)**

The test is sun according to a loading schedule with 14 different cycles. For each cycle, the schedule specifies a type of wheel to be used (soft rubber, hard rubber, or steel), the amount of weight to be stacked above each wheel, and the total number of cart revolutions to be executed. After the completion of each cycle, the sample floor section is visually examined for chipped tiles,



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broken tiles, loose tiles, popped-up grout joints, cracked grout joints and powdered grout joints.
The test method defines each of these characteristics, and quantifies the degree of which each one can be observed prior to designating failure of the tile floor sample.

**TABLE 1 Loading Schedule for Testing**

| Cycle | Type of Wheels | Total Weight per Wheel lbs (kg) | Duration of Test, h | Total Number of Revolutions |
|---|---|---|---|---|
| 1 | soft rubber | 100 (45) | 1 | 900 |
| 2 | soft rubber | 200 (91) | 1 | 900 |
| 3 | soft rubber | 300 (136) | 1 | 900 |
| 4 | soft rubber | 300 (136) | 1 | 900 |
| 5 | hard rubber | 100 (45) | 1 | 900 |
| 6 | hard rubber | 200 (91) | 1 | 900 |
| 7 | hard rubber | 300 (136) | 1 | 900 |
| 8 | hard rubber | 300 (136) | 1 | 900 |
| 9 | steel | 50 (23) | ½ | 450 |
| 10 | steel | 100 (45) | ½ | 450 |
| 11 | steel | 150 (68) | ½ | 450 |
| 12 | steel | 200 (91) | ½ | 450 |
| 13 | steel | 250 (114) | ½ | 450 |
| 14 | steel | 300 (136) | ½ | 450 |

To interpret Robinson floor test, technicians refer to the TCA Handbook for Ceramic Tile Installation. According to the Floor tiling Guide of TCA handbook, the incremental completion of ASTM cycles without failure can be categorized into one of five different service levels:

- Sample floor sections completing cycles 1 through 3 without failure: “Residential” rating
- Samples completing cycles 1 through 6: “Light”commercial rating
- Samples completing cycles 1 through 10: “Moderate” commercial rating
- Samples completing cycles 1 through 12: “Heavy” commercial rating
- Samples completing all 14 cycles without failure are assigned en “Extra heavy” commercial rating.

According to the Floor Tiling Guide of the TCA Handbook, the incremental completion of ASTM C627 cycles without failure can be categorized into one of five different service levels, each one corresponding to a specific final destination of the flooring:

- Residential: kitchens, bathrooms and foyers
- Light: light commercial use in office space, reception areas, kitchens and bathrooms
- Moderate: normal commercial and light institutional use in public space of restaurants and hospitals
- Heavy: shopping malls, stores, commercial kitchens, work areas, laboratories, auto showrooms and service areas, shipping/receiving and exterior decks
- Extra heavy: extra heavy and high-impact use in food plants, dairies, breweries, and kitchens.

*Laminam 5 rating*
Please find in attachment Laminam 5 test report issued by TCNA (Tile Council of North America), with final rating “HEAVY”.
The adhesive used has a classification of C2ES2 (highly deformable cementitious improved adhesive), according to ISO 13007.
For the recommended installation techniques (features of the substrate, back buttering method of application of the adhesive, trowels, size and number of joints and grouting), please make reference to “Laminam Technical Guide”.

We remain available in case of further information
Best regards

Laminam SpA
Project Management



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**ATTACHMENT** – Laminam 5 – Robinson test (performed by TCNA)

TILE COUNCIL OF NORTH AMERICA, INC.

PRODUCT TESTING SERVICE

100 Clemson Research Blvd. □ Anderson, SC 29625 □ Tel (864) 646-TILE □ Fax (864) 646-2821

**TCNA TEST REPORT NUMBER: TCNA-491-12** **PAGE:** 1 **OF** 2

**TEST REQUESTED BY:** Laminam SPA
Attn: Marina Fiore
Via Ghiarola Nuova N°258
41042 Fiorano Modenese (Mo)
Italy

**TEST SUBJECT MATERIAL:** Identified by client as: **Laminam 5**

**TEST DATE:** 10/25/12/ - 10/26/12

**TEST PROCEDURE:** **ASTM C627: "A Standard Test Method for Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester"**

*Materials:*
A thin-set installation over a concrete base was prepared using the following materials:

1) A 48" x 48" x 2" concrete base with a smooth finish
2) Mapei Kerabond mortar with Mapei Keralastic latex additive
3) Laminam 5 (2 mm grout joints)
4) Mapei Keracolor FF grout

*Base and Underlayment:*

A concrete base with a smooth face was prepared and cured for at least 28 days.

*Tile and Grout:*

Mapei Kerabond thin-set mortar, mixed with Mapei Keralastic latex additive per manufacturer's instructions, was troweled on to the concrete base with a 1/4" x 3/8" U-notched trowel. The thin-set mortar was first keyed-in with the flat side of the trowel and then combed with the notched side to form parallel ridges. Each individual tile was back buttered using a 1/4" x 1/4" U-notched trowel before setting to ensure proper coverage. Special care was taken to make sure the ridges on the tile and subfloor were running parallel with each other. A float was used to force out air pockets between the subfloor and tile. After the tiles were installed, the thin-set was allowed to cure for 24 hours before grouting.

Katelyn Simpson
Laboratory Manager

**11/5/12**
Date






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**TCNA TEST REPORT NUMBER: TCNA-491-12** **PAGE:** 2 **OF** 2

**TEST SUBJECT MATERIAL:** Identified by client as: **Laminam 5**

**TEST PROCEDURE:** **ASTM C627: "A Standard Test Method for Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester"**

*Tile and Grout continued:*

Mapei Keracolor FF grout, mixed with water per manufacturer's instructions, was forced into the 2 mm grout joints with a rubber float. Excess grout was removed with the edge of the float. The grout was allowed to cure for approximately 20 minutes before the installation was cleaned with a sponge and water. The grouted installation was allowed to cure for at least 7 days per client's request.

At the end of the cure period, the installation was subjected to load cycling as defined in ASTM C-627.

**TEST RESULTS:**

The installation completed seven cycles with no evidence of damage to the tile or grout joints. At the completion of cycles eight (hard rubber wheels, three hundred pounds per wheel) there was one chipped tile. At the completion of cycle fourteen (steel wheels, three hundred pounds per wheel) there was one additional chipped tile. At this point, the damage constituted failure of the installation according to the evaluation criteria of ASTM C627. All evaluation criteria were based on 4 tiles and 4 grout joints in the wheel path of the Robinson-type floor tester.

**CONCLUSION:**

In accordance with the Performance Level Requirement Guide and Selection Table of the 2012 *TCNA Handbook for Ceramic, Glass, and Stone Tile Installation* (page 31), the installation is classified as "HEAVY".

Katelyn Simpson
Laboratory Manager

**11/5/12**
Date







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