RAIFIX SYSTEM

SAFETY RETAINING HOOKS FOR SLABS AND
TILES INSTALLED ON A WALLS WITH ADHESIVE

LABORATORY TEST REPORT AND SPECIFICATIONS

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1_Introduction

Raimondi S.p.A. has commissioned an extensive series of tests at accredited laboratory CertiMaC, based in Faenza (Ravenna), in order to certify reliability of the RAIFIX system.

Certimac is a technical authority with a pioneering approach to product analysis, certification and research, and the material testing laboratory.

CertiMaC works alongside the construction, energy, environment, and infrastructure industry in partnership with **ENEA**[1] and **CNR**[2], **i.e. its founding members and current majority shareholders**.

The laboratory offers specialist skills and innovative services to certify and improve the performance of conventional and advanced construction materials.

At present, there are no specific regulations regarding the safety of the retaining systems used for tiles fitted on walls with adhesive, so we have established (experimentally, through laboratory tests) the performance of the RAIFIX hooks in the configurations in which the hooks will be used in situ. **Due to the lack of specific regulations, the product cannot be certified and consequently CE marked.**

2_Premise

The RAIFIX system must always be used following assessment and authorisation by competent technical personnel such as, for example, the architect or civil engineer in charge of the construction site.

Use of the RAIFIX system does not exempt users from ordinary maintenance and periodic inspections of walls, and any slab which looks likely to come away from the substrate (wall) must be promptly made safe and replaced.

3_What is the purpose of the RAIFIX system?

The RAIFIX system was created to allow wall tiles to be fitted using adhesive in compliance with current regulations (these vary from country to country, in Italy - for example - UNI11493-1, §7.13.7 applies). Most regulations require the adoption of a certain safety/retaining system depending on the size of the tile and the height from the ground at which it is installed. We recommend you read up on the legislation in force where the construction site is located and where the RAIFIX system will be used.

4_What is included in the RAIFIX system?

The system consists of steel hooks (RAIFIX) and the cutting tool (RAICUT.)

The RAIFIX hook is a mechanical retainer that prevents the tile/slab falling off the wall if the adhesive loses its grip.

RAIFIX hooks are available in three versions:

- for tiles with a minimum thickness of 5 mm
- for tiles with a minimum thickness of 6 mm
- for tiles with a minimum thickness of 8 mm

RAICUT is a tool which can be used to notch the back of the tile/slab as necessary to fit the RAIFIX hook.

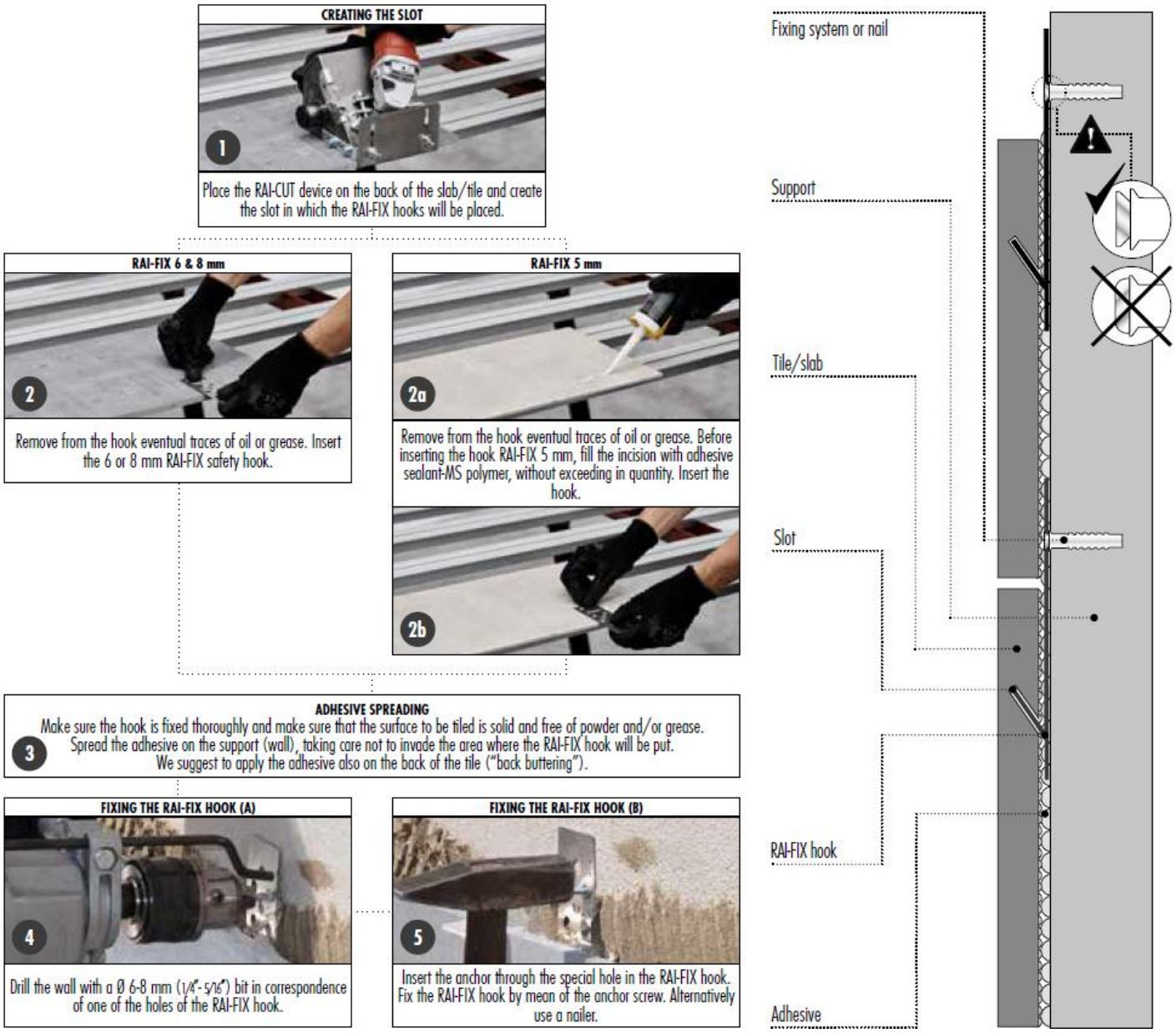
For further technical/sales information about the RAIFIX hooks and RAICUT tool, please refer to the specific literature.

[1] *Italian national agency for new technologies, energy and sustainable economic development*
[2] *Italian national research council*

5_How to use/install RAIFIX

Proper use and installation of the RAIFIX system is outlined in detail in the specific manuals, which must be read carefully before use.

A brief explanation is provided below, **which does not replace the said manuals**.



The notch made in the tile or slab is essential to ensure the system works properly and therefore the instructions for use of the RAICUT tool must be followed exactly.

The decision to adopt and install the RAIFIX hook wall fastening system must be made carefully, taking into account all the characteristics of the substrate, as well as the environmental conditions and the characteristics of the construction site.

6_How and when RAIFIX starts working

The hook only comes into action i.e. acts as a mechanical retainer, when the adhesive loses its grip and the tile/slab comes away from the wall.

If this occurs, instead of falling, the tile/slab will be held in place by the RAIFIX hook (which is appropriately anchored permanently to the substrate/wall).

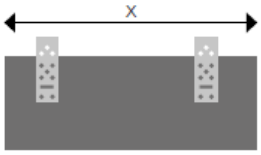
The weight of the ceramic item applies tensile load to the hooks (or hook).

7_How many hooks are required (approximately)?

Deciding how many hooks to mount for each tile/slab is the designer's responsibility and the decision must be based on variables such as the size and weight of the tile/slab and environmental aspects.

The table below outlines the approximate **minimum** number of hooks required based on the length of the side of the tile into which the hooks will be inserted and the weight of the tile. The more hooks used per tile (in compliance, of course, with the parameters stated below), the safer the installation is.

Remember that the amounts needed stated here are approximate.

		MAX 						PIECES PER TILE	
		RAI-FIX 5 mm **with** MS polymer adhesive		RAI-FIX 6 mm **without** MS polymer adhesive		RAI-FIX 8 mm **without** MS polymer adhesive			
0 < x ≤ 60 cm	0 "< x ≤ 24"	33 Kg*	72 lbs*	45 Kg*	99 lbs*	37 Kg*	81 lbs*	1	
60 < x ≤ 200 cm	24" < x ≤ 79"	66 Kg*	145 lbs*	90 Kg*	198 lbs*	74 Kg*	163 lbs*	2	
200 < x ≤ 320 cm	79" < x ≤ 126"	99 Kg*	218 lbs*	135 Kg*	297 lbs*	111 Kg*	244 lbs*	3	

** Conservatively, in the tables it has been considered halved loads for 6 and 8 mm hooks and equal to 25% loads for 5 mm hooks compared to the maximum potential measured by the laboratory.*

It should be noted that:

- the maximum load values (weight) for the RAIFIX 5-mm hook apply to the hook when used together with MS polymer adhesive and were extrapolated by applying a safety factor of 4 (25%) to the values produced in the laboratory tests

- the maximum load values (weight) for the 6-mm and 8-mm hooks apply to the RAIFIX 5 mm hook used without MS polymer adhesive and were extrapolated by applying a safety factor of 2 (50%) to the values produced in the laboratory tests

However, it is always the designer's duty to decide the number of hooks per tile/slabs based on the regulations in force and the specific variables of the construction site, including environmental variables, the type of substrate, and the anchors and/or nails used.

8_An example of the system in use

It is critical that RAIFIX system is installed according to the instructions/information below and the utmost professionalism is required to ensure the system work as it should.

Regarding this aspect, it must be checked that:

- the notches on the back of the tile are made exclusively with the RAICUT tool;
- the notch(es) is (are) positioned correctly on the back of the tile (see RAICUT manual), i.e.:
  - at least 30 mm from the upper edge of the tile;
  - at least 100 mm from the side edge of the tile;
  - positioned symmetrically with respect to the centre of gravity of the tile/slab, so as to spread the weight of the product evenly;
  - in the event that several hooks are fitted on one tile/slab, a distance of at least 400 mm between the notches is necessary.
- The RAICUT tool must be set correctly for the thickness of the tile/slab and the hook to be inserted, for example on thicknesses of 8 mm, leave a thickness of at least 1.6 mm under the notch (see the RAICUT manual for details);
- the hook is inserted into the notch fully, leaving no gap between the hook and the tile/slab.

In the example in Figure 1 (which shows an example of how to mount RAIFIX on an 8 mm-thick 90x30 cm tile) two RAIFIX hooks are fitted in the tile. Note how the weight of tile P is distributed equally between the two hooks.

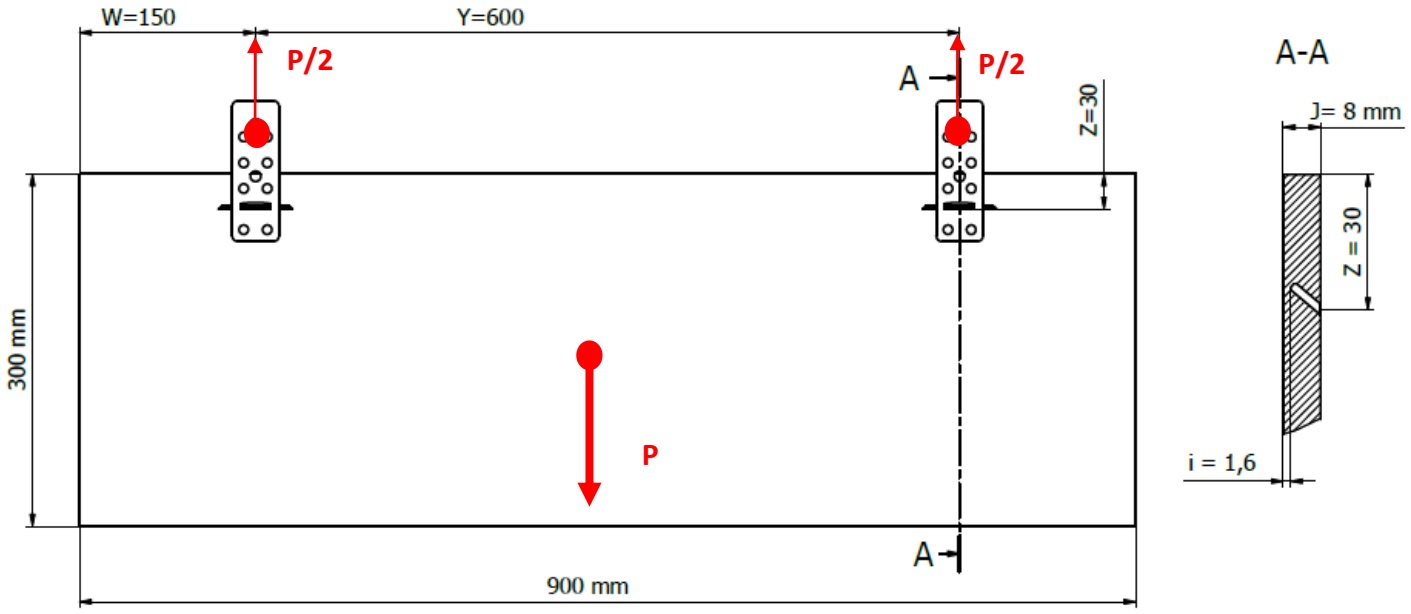


Figure 1. ***Example of RAIFIX hooks fitted into an 8 mm-thick 900 x 300 slab***

All the instructions regarding the notch, the choice of hook, and the number of hooks to be used depend on the results of the experimental tests examined below.

9_Tensile strength test performed on RAIFIX hooks

Objectives

The aim of the test is to prove, through laboratory testing, the suitability of the RAIFIX safety hook (in all versions) to support the weight of the tile hooked on to it, as well as to provide the parameters needed to guide the designer in determining the number of hooks required, based on the size and weight of the tile.

Description of the samples

The strength of the RAIFIX hook was determined by the experimental testing of samples composed of a tile + a hook to which a vertical tensile load was applied with a single-axis test machine (please see the attached test report "*RITC_182_2019*" issued by the CertiMaC laboratory).

The test was performed on all three RAIFIX hook models with the following configurations:

a. Configuration G5:

RAIFIX 5 mm hook applied to a 5 mm-thick tile **with the addition of polymer-based adhesive**;

b. Configuration G6:

RAIFIX 6 mm hook applied dry to a 6 mm-thick tile;

c. Configuration G8:

RAIFIX 8 mm hook applied dry to a 8 mm-thick tile;

For each configuration, the test was carried out on seven 30x30 cm tiles with a notch made (with the RAICUT tool) at a distance of 30 mm from the upper edge of the slab (Figure 2).

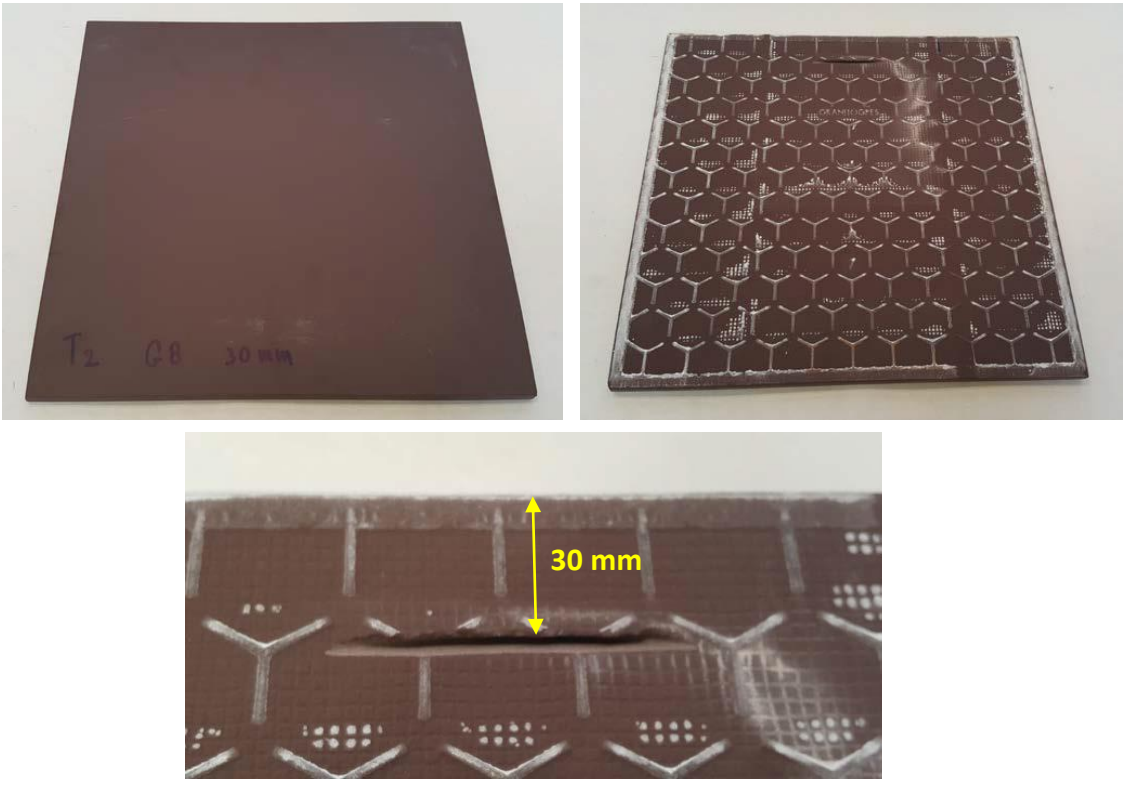


Figure 2. ***Example of a notched G8 slab (front, back and notch detail)***

For all the materials making up the samples, technical sheets and certificates were collected (attached to this report) to identify the test material.

More specifically:

- The polymer-based adhesive/sealant used for the RAIFIX 5 mm hook was an MS polymer adhesive (see technical data sheet in §13 "*MS polymer ST* ") and it was applied according to the manufacturer's instructions.
- The tiles are made of porcelain stoneware with the certified characteristics stated on the technical data sheet in §13 "*DECLARATION OF PERFORMANCE*", according to EN14411:2012;
- All RAIFIX hooks are made of AISI304 stainless steel; the hooks which underwent testing have the chemical and mechanical characteristics described in Certificate 3.1 and stated in “cert_180528-ARSU-022” in §13, drawn up according to EN10204.

Static test arrangement

The test arrangement examined in detail below was designed with the aim of realistically simulating what happens to the hook when it is required to carry out its function. In other words, the hook only comes into use when the adhesive with which the tile has been glued to the wall (substrate) stops working (detaches) and therefore the tile remains supported on the wall by the RAIFIX hook alone.

The test arrangement was as follows:

- The tile **(A)** was placed in a upright position, with the rear face (where the hook is fitted inside the notch) resting on a steel plate **(B)**, while the front face was left free (Figure 3) ;
- The tile + hook system was secured at the top by two rigid restraints **(C)** designed to prevent the system sliding upwards when the hook is subjected to tensile loads. This configuration allows the tile to move forward, i.e. to move away from the steel plate (when the hook bends and pushes it). Figure 3, on the right, shows a side view of the tile resting on the steel plate and the clear opening on the other side, which allows its movement during the test.

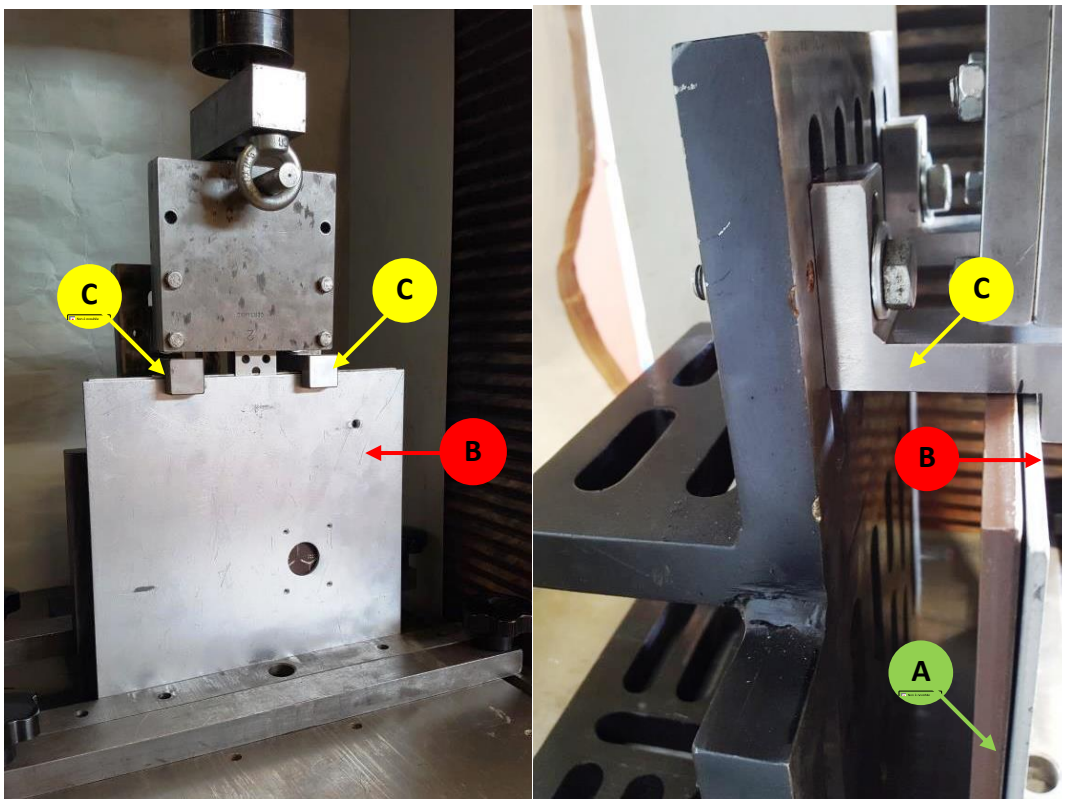


Figure 3. ***Open configuration test layout (side view on the right)***

The arrangement described above is defined as a "free tension" arrangement or an "**open configuration**", i.e. with the tile free to move. As the hook tab is inserted into the notch in the tile, the hook will usually bend.

As stated earlier, this arrangement reflects the way the hook would actually work if the adhesive loses its grip. The steel plate **(B)** simulates the presence of the support-wall while the restraints **(C)** simulate the force of gravity and in general the force that would tend to make the tile/slab fall off the wall.

Figure 4 shows, schematically, how the hook should ideally bend according to the static arrangement described.

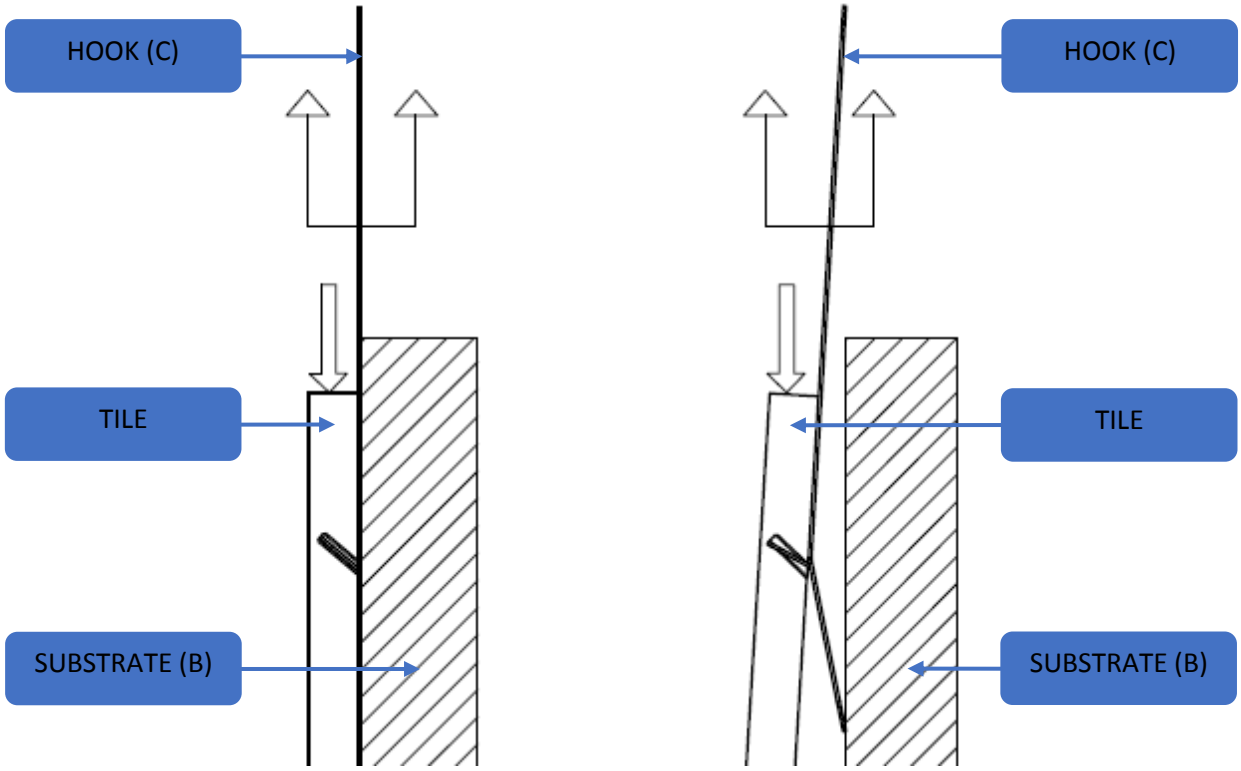


Figure 4. Left: ***Sample in resting position. Right: Sample under tensile load with hook bending***

Test performance

The test was carried out according to the static arrangement described above and by tightening the top of the RAIFIX hook between two knurled plates, to ensure a firm grip without it sliding.

The test was carried out by controlling the stroke of the actuator piston connected to the hook and recording two trends over time: the load applied and the actuator movement, i.e. the deformation of the hook.

The load application speed was set at 2.0 mm/min.

Test results (tables)

The following tables and figures contain the results relating to the samples tested, for the three types of hook.

G5 configuration (RAIFIX 5 mm)

RAIFIX 5 mm hook applied to a 5 mm-thick tile with the addition of polymer-based adhesive

T2-G5	F_{max} [kgf]	A_{Fmax} [mm]	Breakage mode
1	150	3.3	Hook tab bends
2	165	4.3	Hook tab bends
3	137	4.5	Hook tab bends
4	189	4.9	Hook tab bends
5	173	4.3	Hook tab bends
6	162	3.9	Hook tab bends
7	170	3.5	Hook tab bends
mean	164	4.1	
st. dev.	17	0.6	

Table 1. ***Results obtained with the G5 configuration***

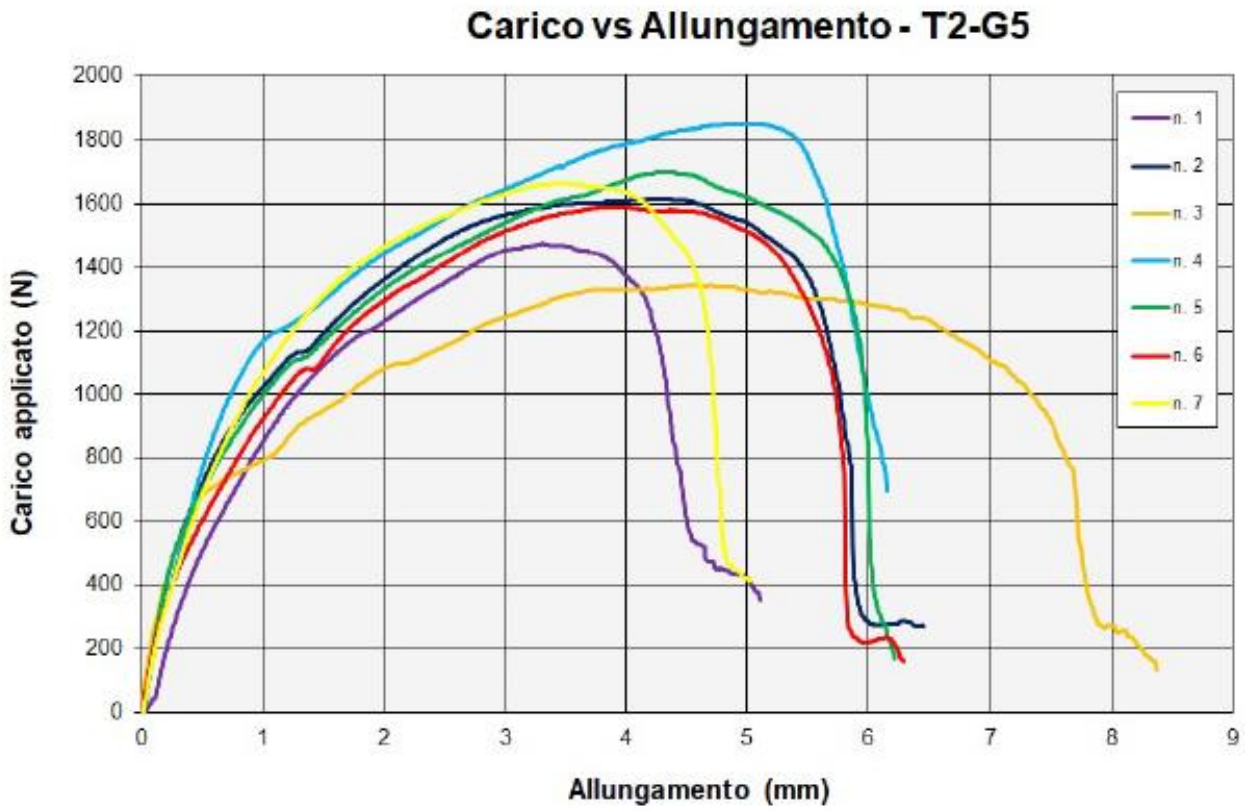


Figure 5. ***Hook elongation - load graph - G5 configuration***

G6 configuration (RAIFIX 6 mm)

RAIFIX 6 mm hook applied dry to a 6 mm-thick tile

T2-G6	F_{max} [kgf]	A_{Fmax} [mm+]	Breakage mode
1	92	10.8	Hook tab bends
2	112	5.7	Hook tab bends
3	86	5.1	Hook tab bends
4	91	5.6	Hook tab bends
5	91	5.5	Hook tab bends
6	102	6.2	Hook tab bends
7	84	6.6	Hook tab bends
mean	94	6.5	
st. dev.	10	2.0	

Table 2. ***Results obtained with the G6 configuration***

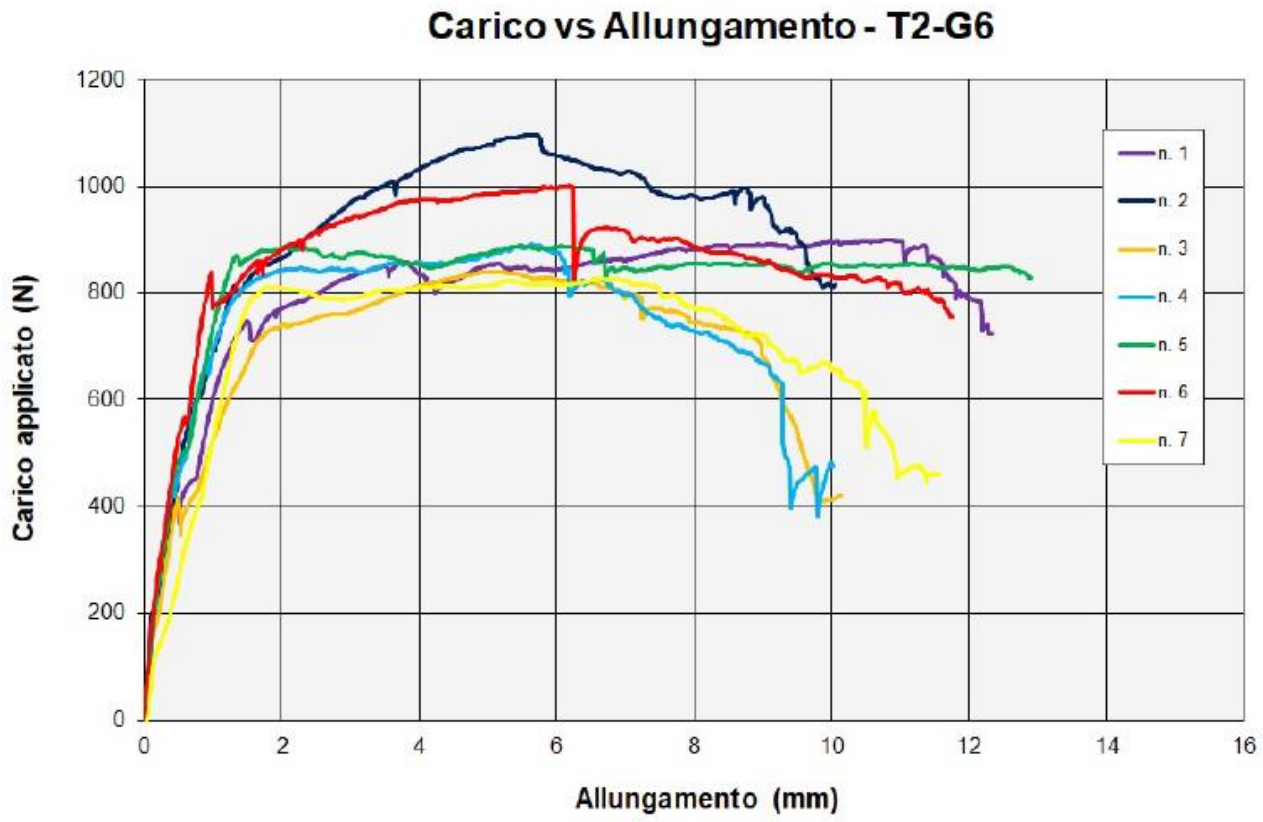


Figure 6. ***Hook elongation - load graph - G6 configuration***

G8 configuration (RAIFIX 8 mm)

RAIFIX 8 mm hook applied dry to a 8 mm-thick tile

T2-G8	F_{max} [kgf]	A_{Fmax} [mm]	Breakage mode
1	74	11.5	Hook tab bends
2	76	11.3	Hook tab bends
3	76	9.2	Hook tab bends
4	79	5.6	Hook tab bends
5	92	1.8	Hook tab bends
6	84	4.1	Hook tab bends
7	87	3.1	Hook tab bends
mean	81	6.7	
st. dev.	7	4.0	

Table 3. ***Results obtained with the G8 configuration***

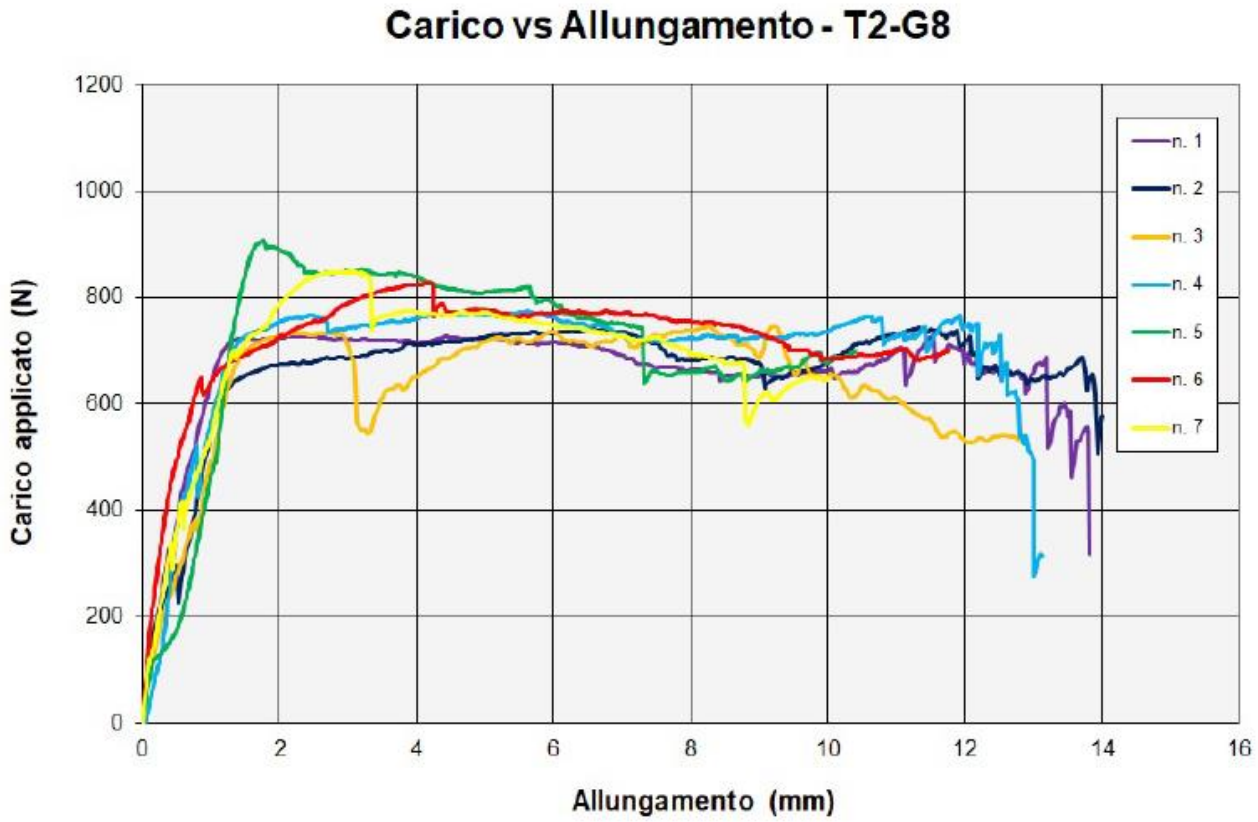


Figure 7. ***Hook elongation - load graph - G8 configuration***

Analysis of the results

During the test the hook underwent deformation: while inserted in the notch, the tab gradually bent downwards. This deformation pushed the tile away from the steel plate (see Figure 8), as - indeed - was expected in accordance with the static arrangement adopted.

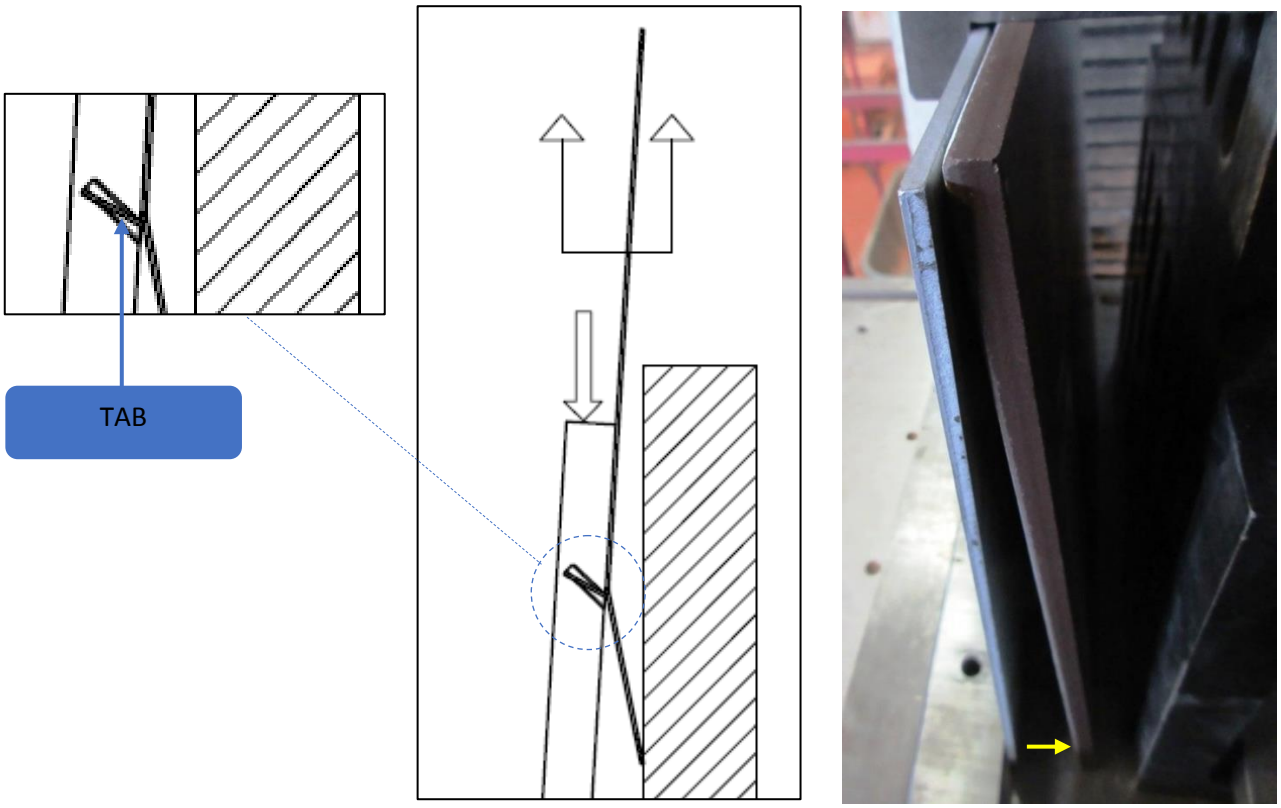


Figure 8. ***During the test, the deformation of the hook moves the tile away from the steel plate***

For all the samples, the hook tab bent and was damaged, while the tile showed only slight chipping on the raw edge where the hook was holding it. Figures 9, 10, and 11 show the breakage modes in the three configurations.

From analysis of Figures 5, 6 and 7, which show the load-elongation graphs for the three configurations, it emerges that, initially, all the hooks behave in the same way, with the tab resisting elastically up to an elongation of approximately 1 mm, after which the tab bends and, depending on the configurations, the following occurs:

- In the **G5 configuration (5 mm hook + 5 mm tile + polymer-based adhesive)** the adhesive begins to work and prevents slippage between the hook and tile; the maximum load reached is very high but is mainly attributable to the strength of the adhesive rather than the hook, which would slip out of the notch with lower loads if there were no adhesive;
- In the **G6 configuration (6 mm hook + 6 mm tile/hook applied dry)** the tab bends but never comes out of the notch in the tile thanks to the **gripping teeth** (Figure 12). The tab remains inserted in the tile and the hook, which continues to be pulled by the actuator, “opens up like a tin". During the removal of the tab from the hook, the maximum load is kept to allow elongation that could be defined infinite (i.e. until the tab comes off the hook completely);
- In the **G8 configuration (8 mm hook + 8 mm tile/hook applied dry)** the same mechanism as described for the G6 occurs.

The hook breakage mode is different in the configuration with the G5 hook with respect to the G6 and G8 hooks; this is because the presence of the adhesive between the tile and the hook is decisive for the final strength.

Figure 9. ***Hook failure mode in the G5 configuration***

Figure 10. ***Hook failure mode in the G6 configuration***

Figure 11. ***Hook failure mode in the G8 configuration***

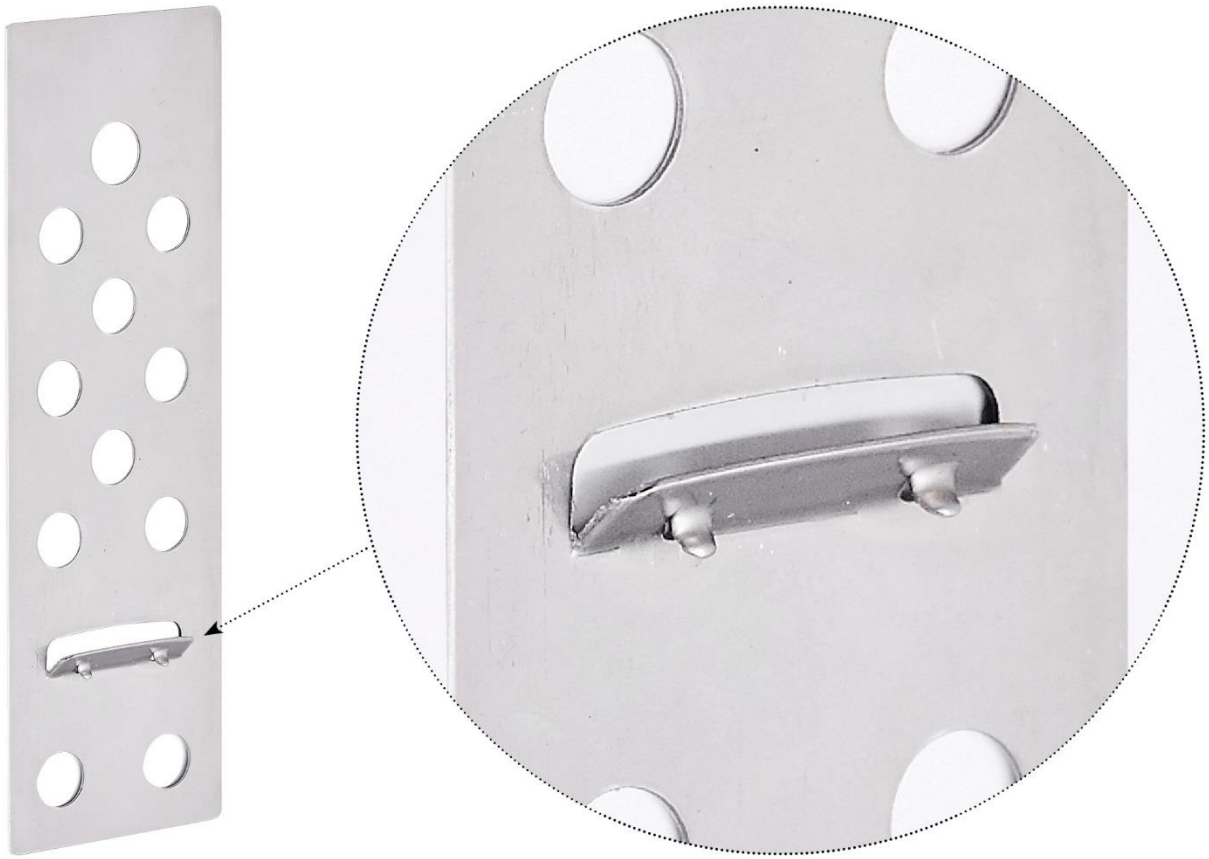


Figure 12. ***Gripping teeth on the tab of a RAIFIX 6 mm hook (G6)***

Experimental tests have shown that the results obtained with the G5 configuration are not comparable to those obtained with the other two configurations, due to the presence of the adhesive, which considerably improves the performance of the system.

The G8 configuration proved to perform less well than the G6 configuration, probably because since the tab on the G6 hook is shorter, it is more rigid and less susceptible to the deformation described above.

To determine the strength of the hooks when the tensile load is applied, the minimum values recorded in the various tests for each configuration were considered with a safety factor (SF) of 2 applied.

For the G5 configuration, given that the adhesive is applied manually and hence there are several variables to consider (such as perfect compliance with the requirements and constant performance over time), it was decided to apply an increased safety factor of 4.

The experimental tensile strengths and the design values (i.e. load-bearing capacity) for the hooks are summarised in Table 4

A	B	C	D	E
Configuration	Configuration description	Minimum Experimental Load (kg)	SF (safety factor)	Max. design load (kg)
G5	RAIFIX 5 mm hook applied to a 5 mm-thick tile with the addition of polymer-based glue	137	4	33
G6	RAIFIX 6 mm hook applied dry to a 6 mm-thick tile	84	2	45
G8	RAIFIX 8 mm hook applied dry to an 8 mm-thick tile	74	2	37

Table 4. ***Experimental load values and maximum design load for RAIFIX hooks***

*

The "max. design load" (column E) is calculated by dividing the minimum experimental load, i.e. the vertical tensile strength test load, by the safety factor (column D) and the aim is to provide a guideline for the designer as to the maximum load for each kind of hook. It remains at the discretion and responsibility of the designer to determine the appropriate safety factor, based on the specific site variables, and apply it to the minimum experimental load (column C).

Conclusions of the tensile strength tests

The tensile strength test results for the RAIFIX hooks (when properly applied following the instructions in this document and in the RAIFIX and RAICUT user manuals) in all three variants (5 mm, 6 mm, and 8 mm) show that the hooks are suitable to support the weight of a tile, even when stringent safety factors are applied. The possibility of using multiple hooks on the same tile (in compliance with the information provided in this document and in the RAIFIX and RAICUT user manuals) extends the use of RAIFIX to practically any tile size.

10_Tensile strength test and notch positioning

Objectives

Further tests were carried out, with a different static arrangement adopted to that of the hook tensile strength tests, with the aim of investigating how performance is influenced by having the notch positioned very close to the upper and side edges of the slab/tile.

The purpose of these tests is to investigate the behaviour of the tile and the hooks when the notch is positioned in very close proximity to the tile edges and to provide guidelines, supported by laboratory tests, about the minimum distance from the edge of the tile required for the hooks (which determines the minimum distance between the cuts/notch on the back of the tile and the edge).

Each end of the notch creates a discontinuity in the tile. We wanted to check whether these areas can trigger cracking. When the adhesive loses its grip and therefore a tile is left hanging on the RAIFIX hooks, it was assumed that cracks could propagate (due to the constant force applied to the RAIFIX hooks) until they reach the edges of the tile, causing the tiles to break and fall.

The aim of this test was to establish whether this hypothesis is true or not and consequently provide the designer with rough guidelines.

The data extrapolated from the tests refers to a given type of porcelain stoneware tile, issued with a Declaration of Performance, as stated in §7, and - in the case of RAIFIX 5 mm hooks - with MS polymer adhesive.

Static test arrangement

The test arrangement is as follows:

- the ceramic tile **(A)** was placed upright and secured on both sides with steel plates **(B)** (see Figure 13). The entire system was secured (in the upper section) by two clamps **(C)**, which were not tightened completely, the purpose of which was to prevent the two containment plates moving away during the test (i.e. when the hook deforms and therefore pushes against the tile, moving it away from the plate on which it is resting).
- when tensile loads are applied to the hook, the system is prevented from sliding upwards by the horizontal bar at the bottom (D), which is glued to the tile along the whole contact surface (30 x 5 cm^2) with a two-part epoxy resin.

We call this configuration the "**closed configuration**" as it prevents the tile falling forward, i.e. moving away from the steel plate as a result of deformation of the hook.

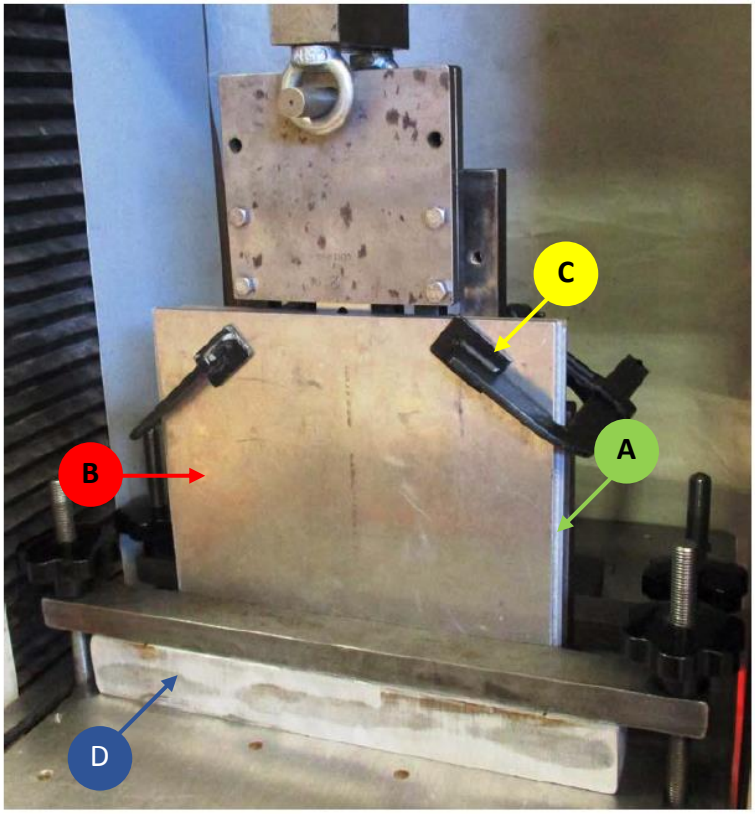


Figure 13. ***Test layout with "closed configuration"***

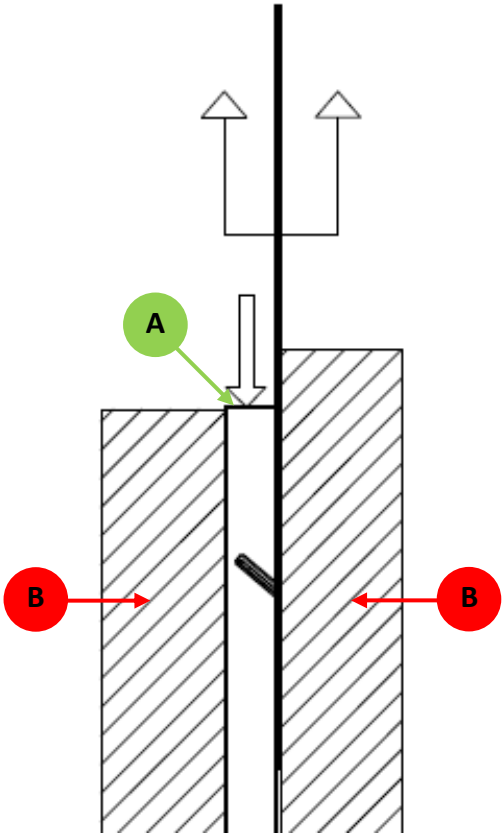


Figure 14. ***Static arrangement with hook rotation prevented. Section view of the tile contained between the two plates.***

Tensile strength test and distance from the upper edge of the tile

The test was performed on samples in the three configurations described in §7, i.e. G5, G6, and G8, with the notch located at two different distances from the upper edge of the tile (please refer to the attached laboratory test report "RITC_181_2019" issued by CertiMaC laboratory), and more specifically:

- 15 mm;
- 30 mm.

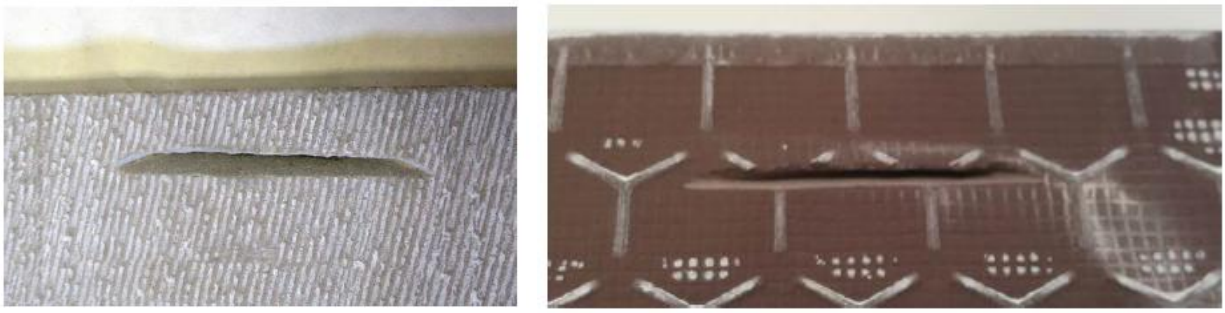


Figure 15. ***Example of notches located 15 mm (left) and 30 mm (right) from the top edge***

The test was carried out in the "closed configuration" and by tightening the top of the RAIFIX hook between two knurled plates, to ensure a firm grip without it sliding.

The test was carried out by controlling the stroke of the actuator piston connected to the hook and recording the load applied over time.

The load application speed was set at 2.0 mm/min.

The following table shows the results for the minimum breaking load for the various kinds of samples tested, i.e., for the three types of hook and the two distances from the edge.

Configuration	Minimum breaking load [kg]	Breakage mode
G5-15mm	139	Tile breakage
G5-30mm	180	Tile breakage
G6-15mm	115	Tile breakage
G6-30mm	158	Tile breakage
G8-15mm	113	Tile breakage
G8-30mm	122	Tile breakage

Table 5. ***Summary of the results obtained***

Analysis of the results

Tile breakage occurred for all the samples, while the hooks remained perfectly intact, without any sign of deformation or damage (see the following figures).

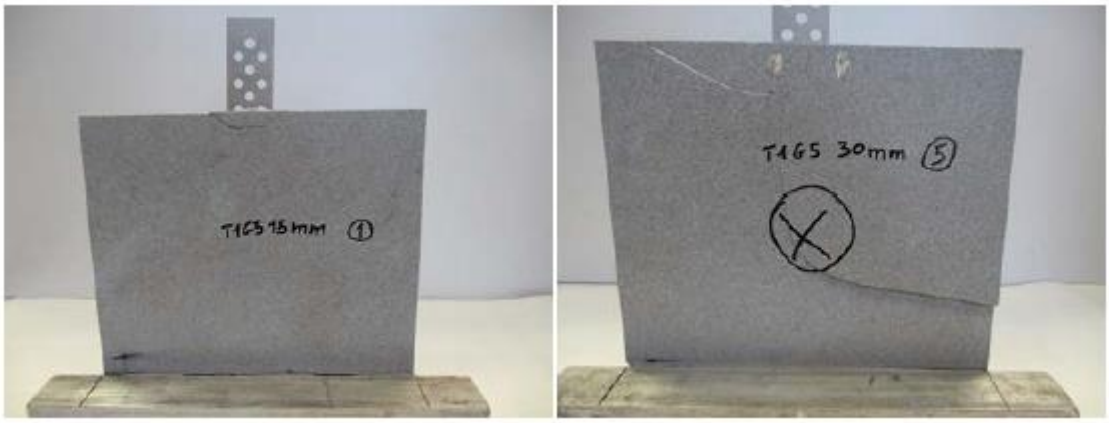


Figure 16. ***Hook failure mode in the G5 configuration (left: 15 mm; right: 30 mm)***

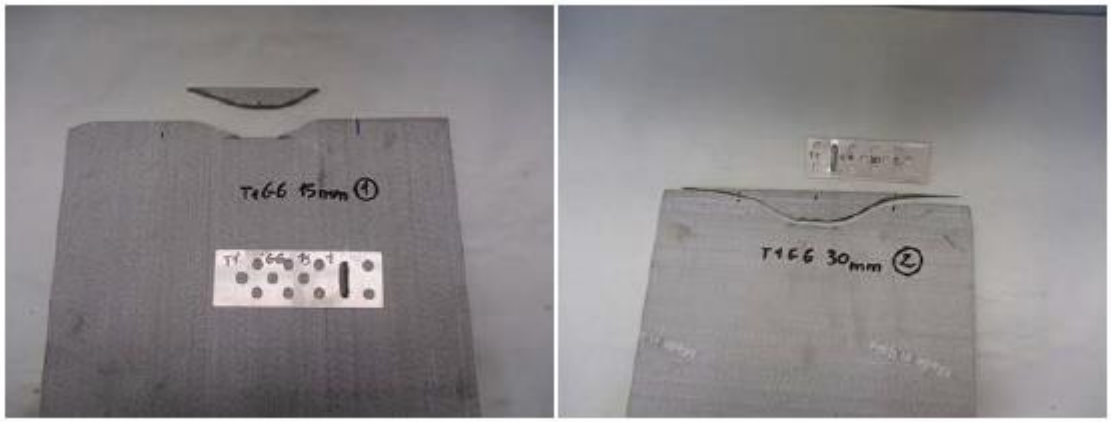


Figure 17. ***Hook failure mode in the G6 configuration (left: 15 mm; right: 30 mm)***

Figure 18. ***Hook failure mode in the G8 configuration (left: 15 mm; right: 30 mm)***

As can be seen in Table 5, the systems made with a notch 30 mm from the edge have greater loads than those made with only a 15 mm distance (as could be expected).

The tile breakage shows how the notch position weakens the system in terms of tile breaking strength, while the load-bearing capacity of the hook remains the same if the hook is prevented from deforming.

Comparison of the information in Table 5 with the tensile strength of the hook found with the tests in §7 shows how the values in Table 5 (tile side breakage mode) are always higher than the tensile strength of the hooks (shown in Table 4).

Conclusions relating to tensile strength test and distance from the upper edge of the tile

It can therefore be said that for a material with characteristics similar to those stated on the attached Declaration of Performance and its annexes, when the notch is at least 30 mm away from the upper edge of the tile, it does not affect the capacity of the RAIFIX system.

Tensile strength test and distance from the side edge of the tile

The test was carried out on samples in the three configurations described in §7, i.e. G5, G6, and G8, on tiles measuring 10x30 cm and 15x30 cm, with a notch for the RAIFIX hook made on the centre line of the short side of the tiles and 30 mm from the upper edge (please refer to the attached laboratory test report *"RITC_183_2019"* issued by CertiMaC laboratory).

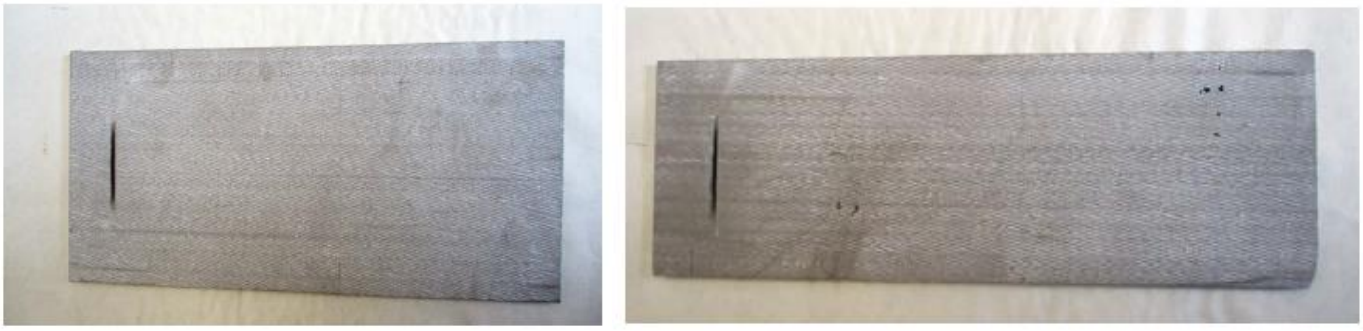


Figure 19. ***Example of 15 and 10 cm wide samples notched along the centre line***

The test was carried out in the "closed configuration" and by tightening the top of the RAIFIX hook between two knurled plates, to ensure a firm grip without it sliding.

The test was carried out by controlling the stroke of the actuator piston connected to the hook and recording the load applied over time.

The load application speed was set at 2.0 mm/min.

The following table shows the results for the minimum breaking load for the various kinds of samples tested, i.e., for the three types of hook and the two tile sizes.

Configuration	Minimum breaking load [kg]	Breakage mode
G5 - L=10 cm	157	Tile breakage
G5 - L=15 cm	186	Tile breakage
G6 - L=10 cm	112	Tile breakage
G6 - L=15 cm	140	Tile breakage
G8 - L=10 cm	120	Tile breakage
G8 - L=15 cm	126	Tile breakage

Table 6. ***Summary of the results obtained***

Analysis of the results

Tile breakage occurred for all the samples, while the hooks remained perfectly intact, without any sign of deformation or damage (see the following figures).

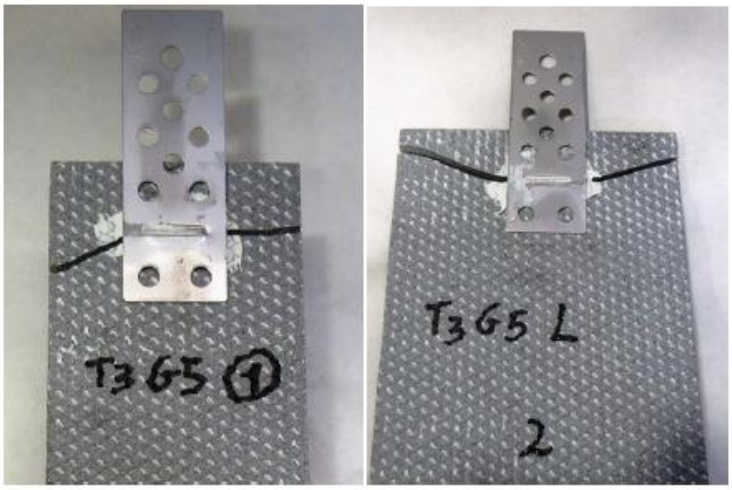


Figure 20. ***Failure mode in the G5 configuration***

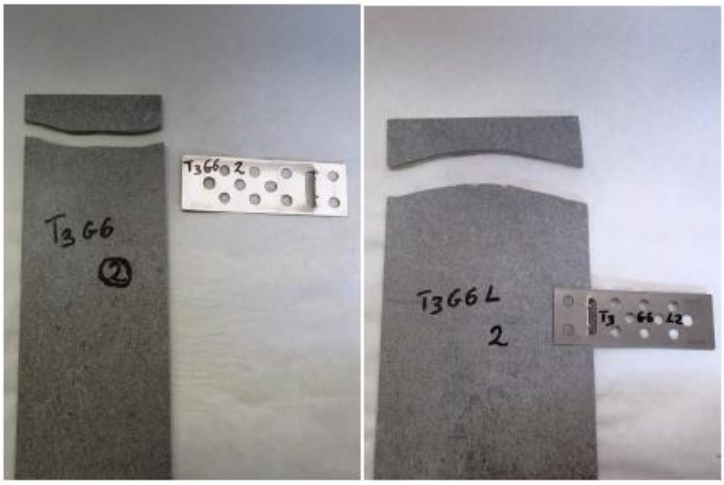


Figure 21. ***Failure mode in the G6 configuration***

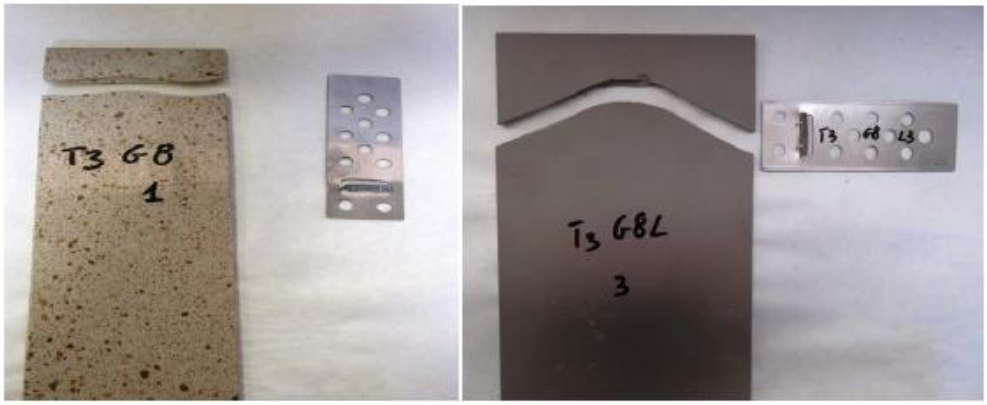


Figure 22. ***Failure mode in the G8 configuration***

Conclusions concerning the tensile strength test in relation to the distance from the side edge of the tile

The tile breakage shows how the having the notch positioned near the side edge weakens the system in terms of tile breaking strength, while the load-bearing capacity of the hook remains the same if the hook is prevented from deforming.

Comparison of the information in Table 6 with the tensile strength of the hook found with the tests in §7 shows how the values in Table 6 (tile side breakage mode) are always higher than the tensile strength of the hooks (shown in Table 4).

It can therefore be said that for a material with characteristics similar to those stated on the attached Declaration of Performance and its annexes, when the notch is at least 75 mm away from the centre and the side edge of the tile, it does not affect the capacity of the RAIFIX system.

11_Tensile strength test and distance between two hooks positioned on the same tile

Objectives

The aim of the tests in the two configurations explained below is to check:

1. in the **open** configuration: whether the use of two hooks positioned symmetrically with respect to the tile's centres of mass increases the load-bearing capacity of the RAIFIX system and, if so, to what extent (please refer to the attached laboratory test report *"RITC_281_2019"* issued by CertiMaC laboratory);
2. in the **closed** configuration: whether the creation of two notches positioned near each other on the tile can create a weak line and possible premature breakage, i.e. breakage before one of the hooks fails (please refer to the attached laboratory test report *"RITC_184_2019"* issued by CertiMaC laboratory).

The test was carried out on samples of 8 mm-thick tiles measuring 40x30 cm, in which two notches were created, both positioned 30 mm from the upper edge and 30 cm apart from each other.

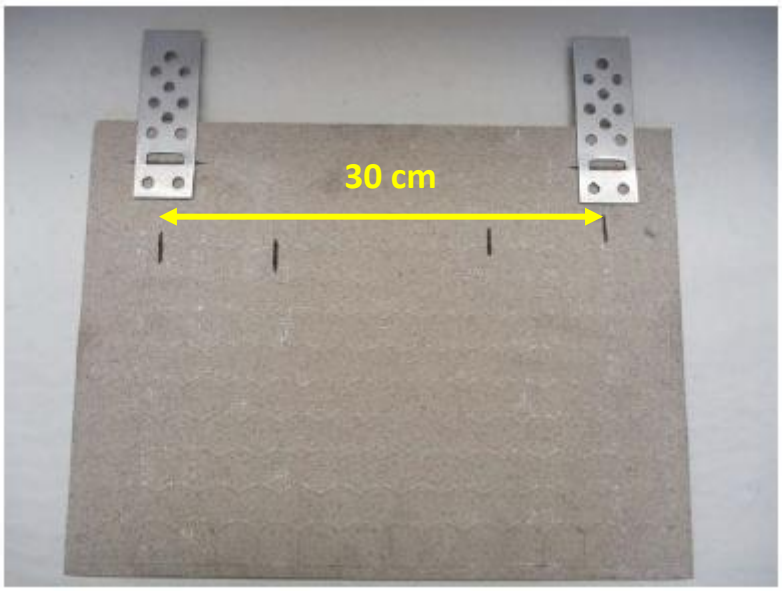


Figure 23. ***Example of sample G8 with two hooks.***

The double-hook samples were only tested in the 8 mm RAIFIX configuration and both the static arrangements already described for the other tests were used, i.e. tensile strength tests with both **open** and **closed** configuration.

The tops of the hooks were clamped between two knurled plates, to ensure a firm grip without them sliding. To distribute the tensile load applied by the actuator piston to the two hooks, a rocker arm **(A)** was created, which was hinged to both the gripping plates so that the force was distributed equally between the two hooks (see Figure 24).

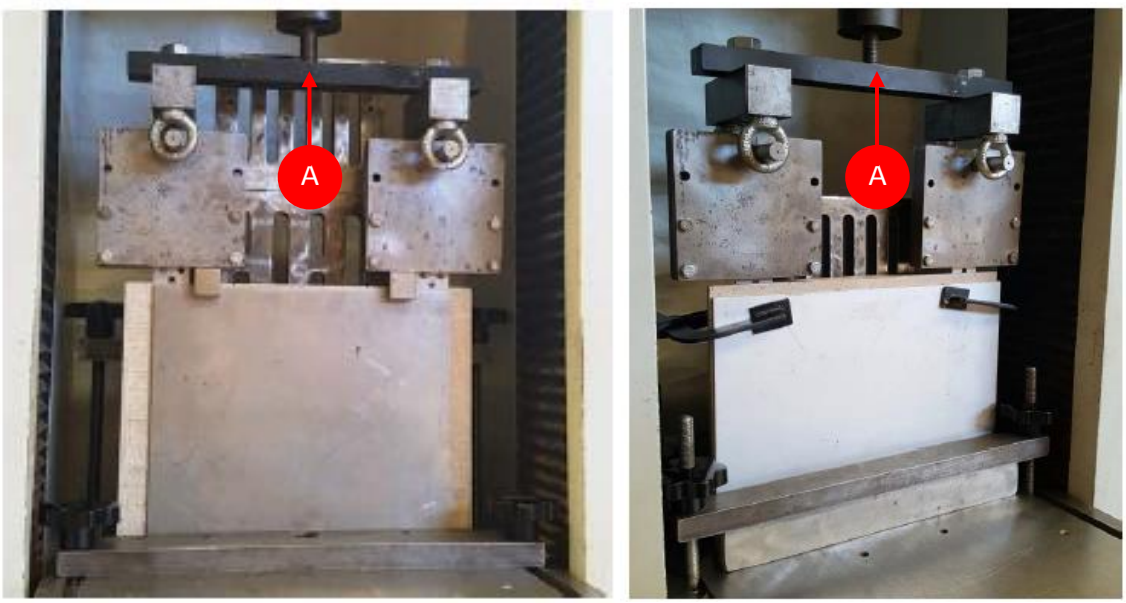


Figure 24. ***Test layout: with an open configuration on the left and a closed configuration on the right***

The test was carried out by controlling the stroke of the actuator piston connected to the hooks and recording the load applied over time.

The load application speed was set, as always, at 2.0 mm/min.

The following tables contain the results relating to the samples tested in the two configurations.

T4-G8	F_{max} [kgf]	Breakage mode
1	156	Hook tab bends
2	172	Hook tab bends
3	177	Hook tab bends
4	178	Hook tab bends
5	147	Hook tab bends
mean	166	
st. dev.	14	

Table 7. ***Results with open configuration***

T4-G8	F_{max} [kgf]	Breakage mode
1	255	Tile breakage
2	248	Tile breakage
mean	252	
st. dev.	5	

Table 8. ***Results with closed configuration***

Analysis of the results

The failure mechanisms that occurred in the two test configurations are similar to those described above:

- Breakage of the tab on the hook in the open configuration, while the tile showed only slight chipping on the raw edge where the hook is inserted;
- Breakage of the tile in the closed configuration while the hooks remain intact, without any sign of deformation or damage.

The two different breaking mechanisms are shown in the following figures.

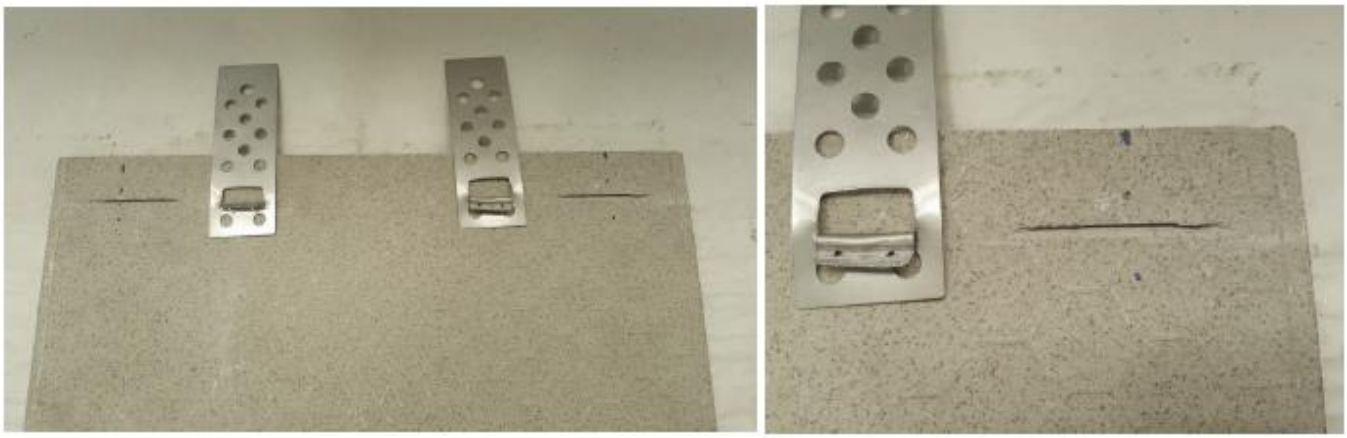


Figure 25. ***Failure mode in the open configuration***

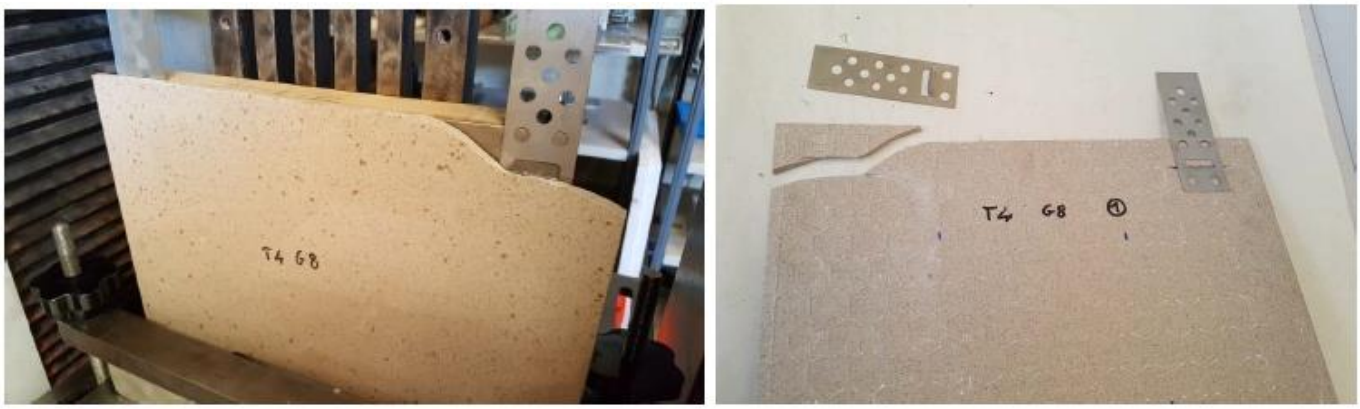


Figure 26. ***Failure mode in the closed configuration***

Conclusions concerning the tensile strength test in relation to the distance between two hooks positioned on the same tile

The following conclusions can be drawn from the results obtained in the two different configurations:

1. As can be seen in Table 7 (concerning the tests in the open configuration), the average load recorded is 166 kg. Bearing in mind that the mean load (shown in Table 3) recorded with only one G8 hook in the strength tests is 81 kg, it can be said that the use of two hooks essentially permits the load to be doubled with respect to the configuration with just one hook;
2. As can be seen in Table 8 (concerning the tests in the closed configuration), the minimum load reached with the tile side breakage mechanism is 248 kg, which is much greater than the values in Table 7, where the breakage mechanism is on the side of the hook. As it can be assumed, therefore, that the hook is a weak element, its breaking strength must be taken into account when scaling the system.

Furthermore, note that the breakage of the tile was always isolated (on one side only) and concerned a single hook, the two notches positioned close to each other do not weaken the tile, therefore two notches located at least 30 cm from each other do not limit the load-bearing capacity of the RAIFIX system.

12_Salt spray testing on RAIFIX

Objectives

The RAIFIX steel hooks (made of AISI 304 stainless steel) are subject to corrosion in the event that the cement adhesive between the tile/slab and substrate is damaged and/or loses its grip.

Once the adhesive fails completely and the weight of the tile/slab is transferred entirely onto the hook and the hook is damaged due to corrosion, the hook may fail at lower loads than expected.

In order to prevent this potential problem, durability tests were carried out by means of artificial aging in salt mist (please refer to the attached laboratory test report *"RITC_185_2019"* issued by CertiMaC laboratory);

The experimental test was performed in accordance with UNI EN 9227: 2017.

Test performance

The test was performed on two RAIFIX hook sizes:

- RAIFIX 6 mm hook:
  four samples in normal (intact) condition (Figure 27A);
  four samples with scratches/damage caused deliberately (Figure 27B).

- RAIFIX 8 mm hook:
  four samples in normal (intact) condition (Figure 28A);
  four samples with scratches/damage caused deliberately (Figure 28B).

The test was performed not only on samples in normal condition, but also on samples with notches/scratches made intentionally on the surface, with the aim of damaging the surface and therefore the passivating film present on the samples (aiming, therefore, to trigger corrosion).

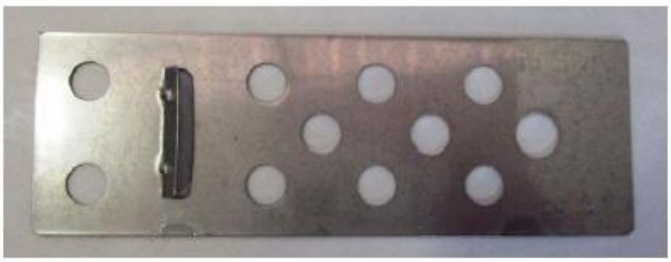


Figure 27A. ***RAIFIX 6 mm hook in normal (intact) condition***

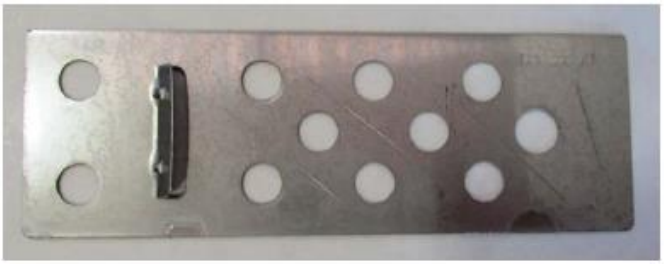


Figure 27B. ***6 mm RAIFIX hook with scratches made intentionally***

Figure 28B. ***RAIFIX 8 mm hook in normal (intact) condition***

Figure 28B. ***8 mm RAIFIX hook with scratches made intentionally***

The experimental tests were conducted in accordance with UNI EN 9227:2017 in order to highlight any defects in the material or its surface treatment.

Neutral salt spray conditioning (NSS) continued for a total duration of 1000 hours (with intermediate check at 500 h), with the test parameters required by the standard and shown in Table 9.

Test parameter	Neutral salt spray (NSS)
Temperature [°C]	35 ± 2
Average speed of horizontal surface collection: 80 cm^2 [ml/h]	1.5 ± 0.5
Sodium chloride concentration (collected solution) [g/l]	50 ± 5
pH (collected solution)	[6.5 ÷ 7.2]

Table 9. ***NSS test parameters***

At the end of the conditioning, 14 of the 16 samples had not changed in any way and showed no defects. Only two samples (Figure 29) had rust problems: in both cases the rust had originated at the central hole.

Figure 29. ***Samples with rust formation***

Conclusions

The samples passed the test brilliantly (taking into account the stringency of the test) with only two hooks showing signs of rust but not enough to affect hook performance.

13_Technical data sheets

- ***Declaration of Performance (porcelain stoneware tiles)***

DECLARATION OF PERFORMANCE

No. **001**

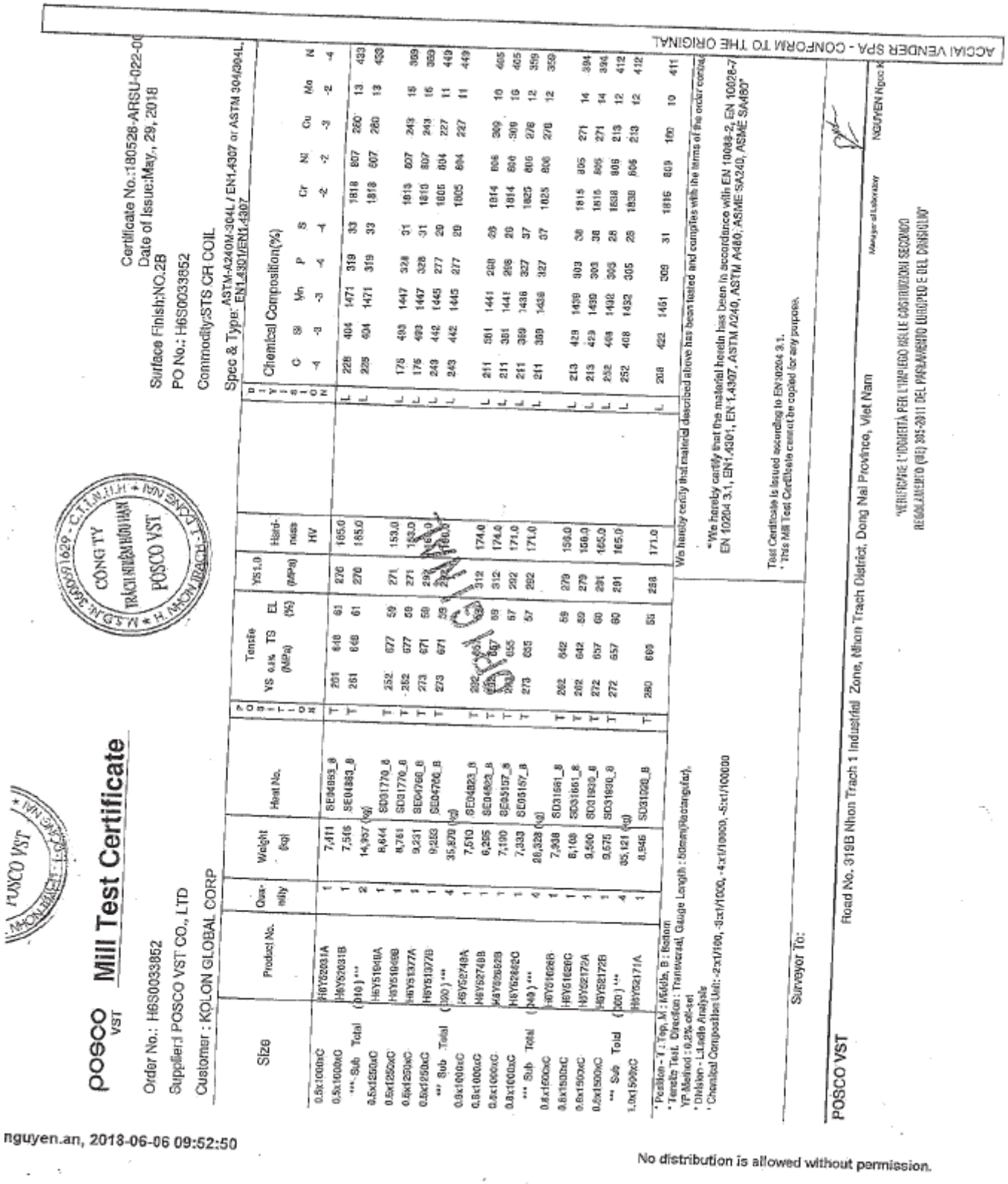
1. Unique identification code of the product type:
   Dry-pressed ceramic tiles, with water absorption $E_b \leq 0,5$ %
2. Type, batch or serial number or any other element allowing identification of the product
   Dry-pressed ceramic tiles, with water absorption $E_b \leq 0,5$ %
3. Intended use(s)
   For internal and external walls and floorings
4. Name or registered trade mark, and contact address of the manufacturer

5. N.A.
6. System(s) of assessment and verification of constancy of performance (AVCP)
   System 4
7. Name and identification number of notified laboratory, if relevant N.A.
   Task(s) carried out N.A.
   AVCP system N.A.
   Document issued and date of issue N.A
8. N.A.
9. Declared performances

Essential characteristics	Performance	Harmonised technical specification
Reaction to fire	**$A1_{FL}$/A1**	**Based on the decision 96/603/CE and its changes**
Release of dangerous substance, for:		**EN 14411:2012**
- Cadmium*	**NPD**	
- Lead*	**NPD**	
Breaking strength Thickness ≥ 7.5 mm **Breaking strength Thickness < 7.5 mm**	**> 1 300 N** **> 700 N**	
Slipperiness**	**NPD**	
Tactility***	**NPD**	
Bond strength/adhesion, for:		
Cementitious adhesive, type C2	**NPD**	
Thermal shock resistance	**Pass**	
Durability for:		
- internal use:	**Pass**	
- external use: freeze-thaw resistance	**Pass**	

* Only necessary in the case of materials that come into contact with foodstuffs or when required by corresponding national statutory regulations
**Only necessary when required by corresponding national statutory regulations; for product-specific data see technical information in our catalogue and technical specification.
***Only for tactile floorings, meaning if requested for blind and visually impaired: as a description of the surface

- ***cert_180528-ARSU-022 (RAIFIX hooks)***



ACCIAI VENDER SPA - CONFORM TO THE ORIGINAL

POSCO VST

Mill Test Certificate

Order No.: H6S0033852
Supplier:J POSCO VST CO., LTD
Customer : KOLON GLOBAL CORP

Certificate No.:180528-ARSU-022-00
Date of Issue:May., 29, 2018
Surface Finish:NO.2B
PO No.: H6S0033852
Commodity:STS CR COIL
Spec & Type: ASTM-A240M-304L / EN1.4307 or ASTM 304/304L

Size	Product No.	Quantity	Weight (kg)	Heat No.	POSITION	Tensile YS 0.2% (MPa)	Tensile TS (MPa)	Tensile EL (%)	YS1.0 (MPa)	Hardness HV	TYPE OF TEST	Chemical Composition(%) C	Si	Mn	P	S	Cr	Ni	Cu	Mo	N
												-1	-3	-3	-4	-4	-2	-2	-3	-2	-4
0.5x1000xC	H6Y628931A	1	7,411	SE04883_B	T	261	648	61	276	165.0	L	228	404	1471	319	33	1818	807	260	13	433
0.5x1000xO	H6Y628931B	1	7,546	SE04883_B	T	261	648	61	276	165.0	L	228	404	1471	319	33	1818	807	260	13	433
*** Sub Total	(216) ***	2	14,957 (kg)																		
0.5x1250xC	H6Y516148A	1	8,464	SD31770_B	T	252	677	59	271	153.0	L	176	493	1447	328	31	1813	807	243	15	389
0.6x1250xC	H6Y516148B	1	8,761	SD31770_B	T	252	677	59	271	153.0	L	176	493	1447	328	31	1813	807	243	15	389
0.4x1250xC	H6Y516377A	1	9,231	SE04760_B	T	273	671	58	293	160.0	L	249	442	1445	277	29	1805	804	227	11	449
0.6x1250xC	H6Y516377B	1	9,283	SE04760_B	T	273	671	58	293	160.0	L	249	442	1445	277	29	1805	804	227	11	449
*** Sub Total	(200) ***	4	35,679 (kg)																		
0.9x1000xC	H6Y627748A	1	7,510	SE04823_B	T	282	642	59	312	174.0	L	211	581	1441	288	28	1814	806	309	16	405
0.8x1000xC	H6Y627748B	1	6,295	SE04823_B	T	282	642	59	312	174.0	L	211	581	1441	288	28	1814	806	309	16	405
0.8x1000xC	H6Y628528	1	7,100	SE05157_B	T	282	655	57	292	171.0	L	211	389	1436	327	37	1825	806	278	12	359
0.8x1000xC	H6Y628620	1	7,333	SE05157_B	T	273	635	57	292	171.0	L	211	389	1436	327	37	1825	806	278	12	359
*** Sub Total	(249) ***	4	28,328 (kg)																		
0.8x1500xC	H6Y616986	1	7,908	SD31661_B	T	262	642	59	279	156.0	L	213	429	1459	303	38	1815	805	271	14	394
0.6x1500xC	H6Y616986C	1	8,168	SD31661_B	T	262	642	59	279	156.0	L	213	429	1459	303	38	1815	805	271	14	394
0.6x1500xC	H6Y621729A	1	9,560	SD31939_B	T	272	657	60	291	165.0	L	252	408	1492	305	28	1838	805	213	12	412
0.6x1500xC	H6Y621729B	1	9,675	SD31939_B	T	272	657	60	291	165.0	L	252	408	1492	305	28	1838	805	213	12	412
*** Sub Total	(300) ***	4	35,121 (kg)																		
1.0x1500xC	H6Y621721A	1	8,946	SD31028_B	T	280	669	55	288	171.0	L	208	422	1461	309	31	1816	809	160	10	411

We hereby certify that material described above has been tested and complies with the terms of the order contract.

"We hereby certify that the material herein has been in accordance with EN 10088-2, EN 10028-7 EN 10204 3.1, EN1.4301, EN 1.4307, ASTM A240, ASTM A480; ASME SA240, ASME SA480"

Test Certificate is issued according to EN 10204 3.1.
* This Mill Test Certificate cannot be copied for any purposes.

* Position - T : Top, M : Middle, B : Bottom
* Tensile Test. Direction : Transversal, Gauge Length : 80mm(Rectangular),
YP Method : 0.2% off-set
* Division - L:Ladle Analysis
* Chemical Composition Unit: -2:x1/100, -3:x1/1000, -4:x1/10000, -5:x1/100000

Surveyor To:

POSCO VST
Road No. 319B Nhon Trach 1 Industrial Zone, Nhon Trach District, Dong Nai Province, Viet Nam

Manager of Laboratory NGUYEN Ngoc K

"VERIFICHE E/O DOCUMENTA PER L'IMPIEGO NELLE COSTRUZIONI SECONDO REGOLAMENTO (UE) 305-2011 DEL PARLAMENTO EUROPEO E DEL CONSIGLIO"

nguyen.an, 2018-06-06 09:52:50

- ***MS-Polymer (polymer-based adhesive/sealer)***

TECHNICAL DATA SHEET - PRO ATTACK - art ADM02

Company

G&B FISSAGGI Srl
Corso Savona 22,
10029 Villastellone (TO) – Italy
Tel +39 011 96 19 433
Fax +39 011 96 19 382
www.gebfissaggi.com
info@gebfissaggi.com

Product description

PRO ATTACK is a high quality, strong one component adhesive with very high grip based on MS POLYMER. That is why support of the adhesive assembly is usually not necessary in general. The product is odourless, neutral and free of silicone and isocyanates. After application PRO ATTACK cures with atmospheric moisture to form a durable rubber seal.

Applications

1. Gluing of panels, skirting boards, windowsills, stripes, thresholds, mirrors and isolating materials.
2. In coach-work and metal connecting joints.
3. Gluing in shipbuilding industry.

Because of the structure of PRO ATTACK it is advised to use a hand gun with reinforced transmission.
In general PRO ATTACK may be used, also without primer, to seal assemblies of glass, glazed surfaces, porcelain, coated metal, epoxy and polyester panels, polystyrene, PVC, polycarbonate, PU, stainless steel, anodized aluminium, copper, zinc, lead and finished wood and HPL panels.
For porous surfaces like concrete and gypsum we recommend to use a primer.

Limitations

It is not recommended for application on PE, PP, Teflon and bituminous surfaces, underwater application and for expansion joints. Not paintable with alkyd resin paint. Yellowing can occur in the dark.
PRO ATTACK can not be applied through a nozzle with a small orifice.

Surface preparation and finishing

Surfaces must be clean, dry and sound. If necessary use a primer. Apply as an adhesive in a 'ventilating' way in vertical stripes with 30 cm distance in between.

Available colours

White.

Packaging

Cartridges of 290 ml.

14_Laboratory test reports

See following pages.

Research Body
Information European Commission
2006/C 323/01

certimac
certificazione materiali per costruzioni
ENEA CNR

TEST REPORT

| RITC_181_2019 |

EXPERIMENTAL DETERMINATION OF THE MECHANICAL RESISTANCE OF THE HOOK/TILE SYSTEM WITH DIFFERENT NOTCHING DISTANCES FROM THE UPPER EDGE (PHASE T1) EXECUTED ON THE PRODUCT CALLED "RAI-FIX" IN THREE DIFFERENT CONFIGURATIONS OF THE COMPANY "RAIMONDI S.P.A.", MODENA (MO).

PLACE AND DATE OF ISSUE:	Faenza, 21st June 2019
COMPANY:	**Raimondi S.p.A.**
PRODUCTION SITE:	Via R. Dalla Costa, 300/A – 41122 Modena (MO)
TYPE OF PRODUCT:	Safety hooks for tiles
STANDARDS APPLIED:	P.O.I.
DELIVERY DATE IN LABORATORY:	6th February 2019
TESTS EXECUTED:	March - June 2019
TESTS EXECUTED BY:	CertiMaC, Faenza

NOTE: Results contained in the present test report exclusively refer to the samples subjected to the tests described hereafter. Moreover, this report is for the exclusive use of the customer within the limits set by mandatory legislation and cannot be reproduced, totally or partially (in digital or paper form), without a written approval of the laboratory.

Test executed by	Written by	Approved by
MSc. Eng. Mattia Morganti	_ MSc. Eng. Mattia Morganti_	_MSc. Eng. Luca Laghi_

CertiMaC soc.cons. a r.l.
Via Granarolo, 62
48018 - Faenza (RA)
Italy (IT)
Tel. +39 0546 678548
www.certimac.it
info@certimac.it

R.I. RA, VAT number
and TAX identification number
2200460398 | R.E.A. RA 180280
Shared capital € 84.000,00 fully paid-up

Research Body
Information European Commission
2006/C 323/01

certimac
certificazione materiali per costruzioni
ENEA CNR

TEST REPORT

| RITC_182_2019 |

EXPERIMENTAL DETERMINATION OF HOOK TIGHTNESS (PHASE T2) CALLED "RAI-FIX" IN THREE DIFFERENT CONFIGURATIONS OF THE COMPANY "RAIMONDI S.P.A.", MODENA (MO).

PLACE AND DATE OF ISSUE:	Faenza, 13th June 2019
COMPANY:	**Raimondi S.p.A.**
PRODUCTION SITE:	Via R. Dalla Costa, 300/A – 41122 Modena (MO)
TYPE OF PRODUCT::	Safety hooks for tiles
STANDARDS APPLIED:	P.O.I.
DELIVERY DATE IN LABORATORY:	6th February 2019
TESTS EXECUTED:	March - June 2019
TESTS EXECUTED BY:	CertiMaC, Faenza

NOTE: Results contained in the present test report exclusively refer to the samples subjected to the tests described hereafter. Moreover, this report is for the exclusive use of the customer within the limits set by mandatory legislation and cannot be reproduced, totally or partially (in digital or paper form), without a written approval of the laboratory.

Test executed by	Written by	Approved by
MSc. Eng. Mattia Morganti	_ MSc. Eng. Mattia Morganti_	_MSc. Eng. Luca Laghi_
Revision -		Page 1 of 10

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R.I. RA, VAT number
and TAX identification number
2200460398 | R.E.A. RA 180280
Shared capital € 84.000,00 fully paid-up

Research Body
Information European Commission
2006/C 323/01

certimac
certificazione materiali per costruzioni
ENEA CNR

TEST REPORT

| RITC_183_2019 |

EXPERIMENTAL DETERMINATION OF THE MECHANICAL RESISTANCE OF THE HOOK/TILE SYSTEM WITH DIFFERENT NOTCHING DISTANCES FROM THE LATERAL EDGE (PHASE T3) CARRIED OUT ON THE PRODUCT CALLED "RAI-FIX" IN THREE DIFFERENT CONFIGURATIONS OF THE COMPANY "RAIMONDI S.P.A.", MODENA (MO).

PLACE AND DATE OF ISSUE:	Faenza, 21st June 2019
COMPANY:	**Raimondi S.p.A.**
PRODUCTION SITE:	Via R. Dalla Costa, 300/A – 41122 Modena (MO)
TYPE OF PRODUCT:	Safety hooks for tiles
STANDARDS APPLIED:	P.O.I.
DELIVERY DATE IN LABORATORY:	6th February 2019
TESTS EXECUTED:	March - June 2019
TESTS EXECUTED BY:	CertiMaC, Faenza

NOTE: Results contained in the present test report exclusively refer to the samples subjected to the tests described hereafter. Moreover, this report is for the exclusive use of the customer within the limits set by mandatory legislation and cannot be reproduced, totally or partially (in digital or paper form), without a written approval of the laboratory.

Test executed by	Written by	Approved by
MSc. Eng. Mattia Morganti	_MSc. Eng. Mattia Morganti_	_MSc. Eng. Luca Laghi_

Revision - Page 1 of 8

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R.I. RA, VAT number
and TAX identification number
2200460398 | R.E.A. RA 180280
Shared capital € 84.000,00 fully paid-up

Shareholders
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Consiglio Nazionale delle Ricerche

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TEST REPORT

| RITC_184_2019 |

EXPERIMENTAL DETERMINATION OF THE MECHANICAL RESISTANCE OF THE DOUBLE HOOK/TILE SYSTEM (PHASE T4) WITH "RIGID" CONTAINMENT ON THE PRODUCT CALLED "RAI-FIX" OF THE COMPANY "RAIMONDI S.P.A.", MODENA (MO).

PLACE AND DATE OF ISSUE:	Faenza, 24th June 2019
COMPANY:	**Raimondi S.p.A.**
PRODUCTION SITE:	Via R. Dalla Costa, 300/A – 41122 Modena (MO)
TYPE OF PRODUCT:	Safety hooks for tiles
STANDARDS APPLIED:	P.O.I.
DELIVERY DATE IN LABORATORY:	6th February 2019
TESTS EXECUTED:	March - June 2019
TESTS EXECUTED BY:	CertiMaC, Faenza

NOTE: Results contained in the present test report exclusively refer to the samples subjected to the tests described hereafter. Moreover, this report is for the exclusive use of the customer within the limits set by mandatory legislation and cannot be reproduced, totally or partially (in digital or paper form), without a written approval of the laboratory.

Test executed by	Written by	Approved by
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Revision- Page 1of 7

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TEST REPORT

| RITC_281_2019 |

EXPERIMENTAL DETERMINATION OF THE MECHANICAL RESISTANCE OF THE DOUBLE HOOK/TILE SYSTEM (PHASE T4) WITH "OPEN" CONTAINMENT ON THE PRODUCT CALLED "RAI-FIX" OF THE COMPANY "RAIMONDI S.P.A.", MODENA (MO).

PLACE AND DATE OF ISSUE:	Faenza, 24th June 2019
COMPANY:	**Raimondi S.p.A.**
PRODUCTION SITE:	Via R. Dalla Costa, 300/A – 41122 Modena (MO)
TYPE OF PRODUCT:	Safety hooks for tiles
STANDARDS APPLIED:	P.O.I.
DELIVERY DATE IN LABORATORY:	6th February 2019
TESTS EXECUTED:	March - June 2019
TESTS EXECUTED BY:	CertiMaC, Faenza

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TEST REPORT

| RITC_185_2019 |

EXPERIMENTAL DETERMINATION OF DURABILITY BY MEANS OF ARTIFICIAL AGEING IN SALT SPRAY FOR 1000 HOURS (PHASE T5) CARRIED OUT ON THE PRODUCT CALLED "RAI-FIX" OF THE COMPANY "RAIMONDI S.P.A.", MODENA (MO).

PLACE AND DATE OF ISSUE:	Faenza, 3rd July 2019
COMPANY:	**Raimondi S.p.A.**
PRODUCTION SITE:	Via R. Dalla Costa, 300/A – 41122 Modena (MO)
TYPE OF PRODUCT:	Safety hooks for tiles
STANDARDS APPLIED:	P.O.I.
DELIVERY DATE IN LABORATORY:	6th February 2019
TESTS EXECUTED:	March - June 2019
TESTS EXECUTED BY:	CertiMaC, Faenza

NOTE: Results contained in the present test report exclusively refer to the samples subjected to the tests described hereafter. Moreover, this report is for the exclusive use of the customer within the limits set by mandatory legislation and cannot be reproduced, totally or partially (in digital or paper form), without a written approval of the laboratory.

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15_Specifications

Item 1: 5 mm RAIFIX SYSTEM

Supply and installation of safety retaining hooks for tiles and slabs with a thickness of 5 mm or above, installed on external walls with adhesive (type: **RAIMONDI 5 mm RAIFIX**), made of AISI 304 stainless steel; dimensions: 120x40x0.5mm, with punched tab designed to be inserted into the back of the tile into a notch cut into the tile specifically for this purpose following application of MS polymer-based sealing adhesive. The tab has one tooth punched into it to provide a non-slip function when the hook is in use. The notch on the back of the tile must be made with a grooving device (type: **RAIMONDI RAI-CUT**) equipped with a universal coupling system for angle grinders with a Ø125 mm dry diamond cutting disc (type: **RAIMONDI art. n. 179CCT125**) angled at 50° to the surface of the tile; the unit is equipped with a Ø38 mm hole for a dust suction tube and a barb connector fitting for connection to a water supply.

The provision includes:

□ Qty.: ..... safety retaining hooks for tiles with thickness of 5 mm or above with characteristics as stated above;

□ Qty.: ..... grooving devices with universal coupling system for angle grinders with characteristics as stated above;

□ Qty.: ..... Ø125 mm diamond cutting discs with characteristics as stated above.

Item 2: 6 mm RAIFIX SYSTEM

Supply and installation of safety retaining hooks for tiles and slabs with a thickness of 6 mm or above, installed on external walls with adhesive (type: **RAIMONDI 6 mm RAIFIX**), made of AISI 304 stainless steel; dimensions: 120x40x0.5mm, with punched tab designed to be inserted into the back of the tile into a notch cut into the tile specifically for this purpose. The tab has two teeth punched into it to provide a non-slip function when the hook is in use. The notch on the back of the tile must be made with a grooving device (**type: RAIMONDI RAI-CUT**) equipped with a universal coupling system for angle grinders with a Ø125 mm dry diamond cutting disc (**type: RAIMONDI art. n. 179CCT125**) angled at 50° to the surface of the tile; the unit is equipped with a Ø38 mm hole for a dust suction tube and a barb connector fitting for connection to a water supply.

The provision includes:

□ Qty.: ..... safety retaining hooks for tiles with thickness of 6 mm or above with characteristics as stated above;

□ Qty.: ..... grooving devices with universal coupling system for angle grinders with characteristics as stated above;

□ Qty.: ..... Ø125 mm diamond cutting discs with characteristics as stated above.

Item 3: 8 mm RAIFIX SYSTEM

Supply and installation of safety retaining hooks for tiles and slabs with a thickness of 6 mm or above, installed on external walls with adhesive (type: **RAIMONDI 8 mm RAIFIX**), made of AISI 304 stainless steel; dimensions: 120x40x0.5mm, with punched tab designed to be inserted into the back of the tile into a notch cut into the tile specifically for this purpose. The tab has two teeth punched into it to provide a non-slip function when the hook is in use. The notch on the back of the tile must be made with a grooving device (**type: RAIMONDI RAI-CUT**) equipped with a universal coupling system for angle grinders with a Ø125 mm dry diamond cutting disc (**type: RAIMONDI art. n. 179CCT125**) angled at 50° to the surface of the tile; the unit is equipped with a Ø38 mm hole for a dust suction tube and a barb connector fitting for connection to a water supply.

The provision includes:

□ Qty.: ..... safety retaining hooks for tiles with thickness of 8 mm or above with characteristics as stated above;

□ Qty.: ..... grooving devices with universal coupling system for angle grinders with characteristics as stated above;

□ Qty.: ..... Ø125 mm diamond cutting discs with characteristics as stated above.