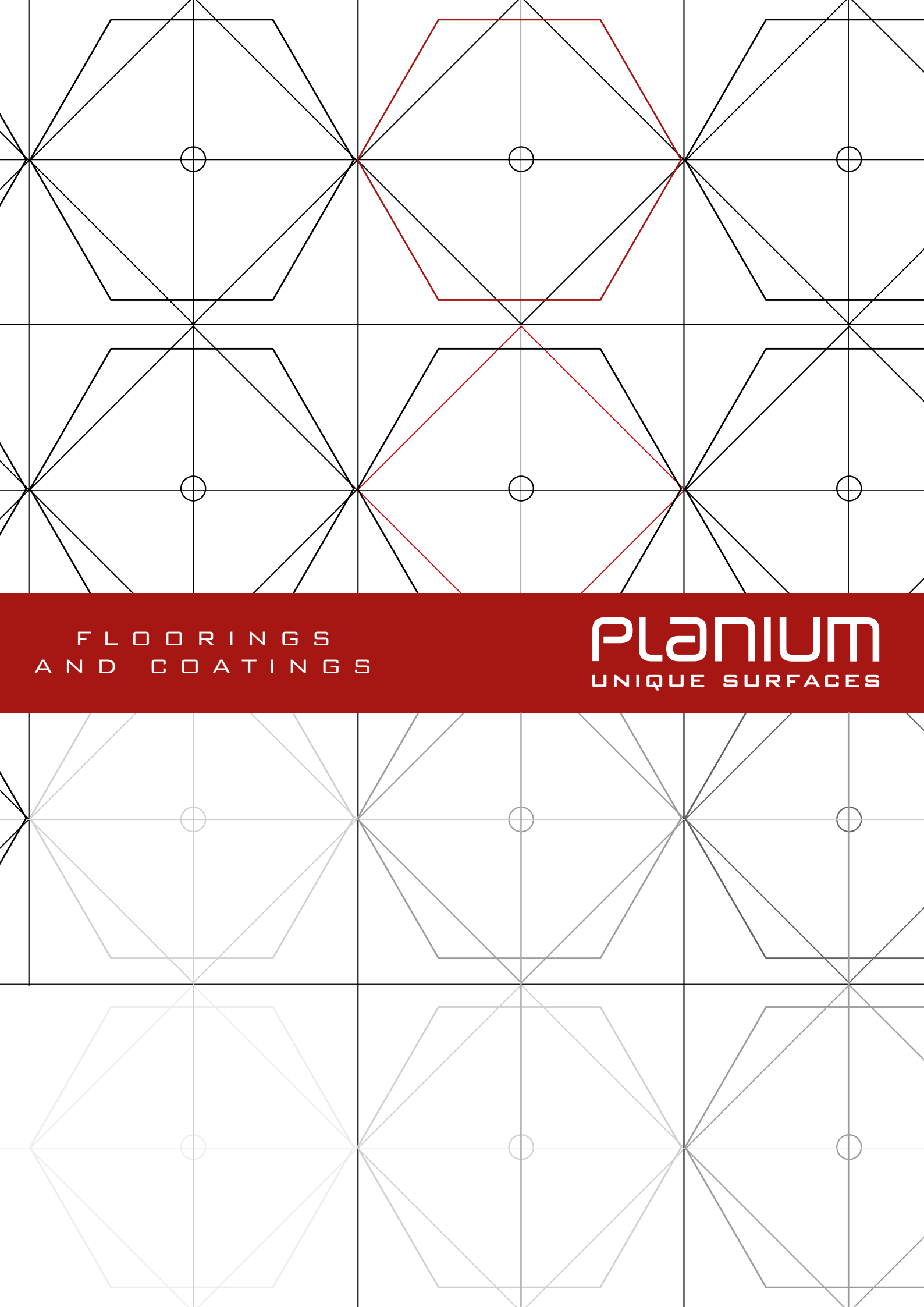
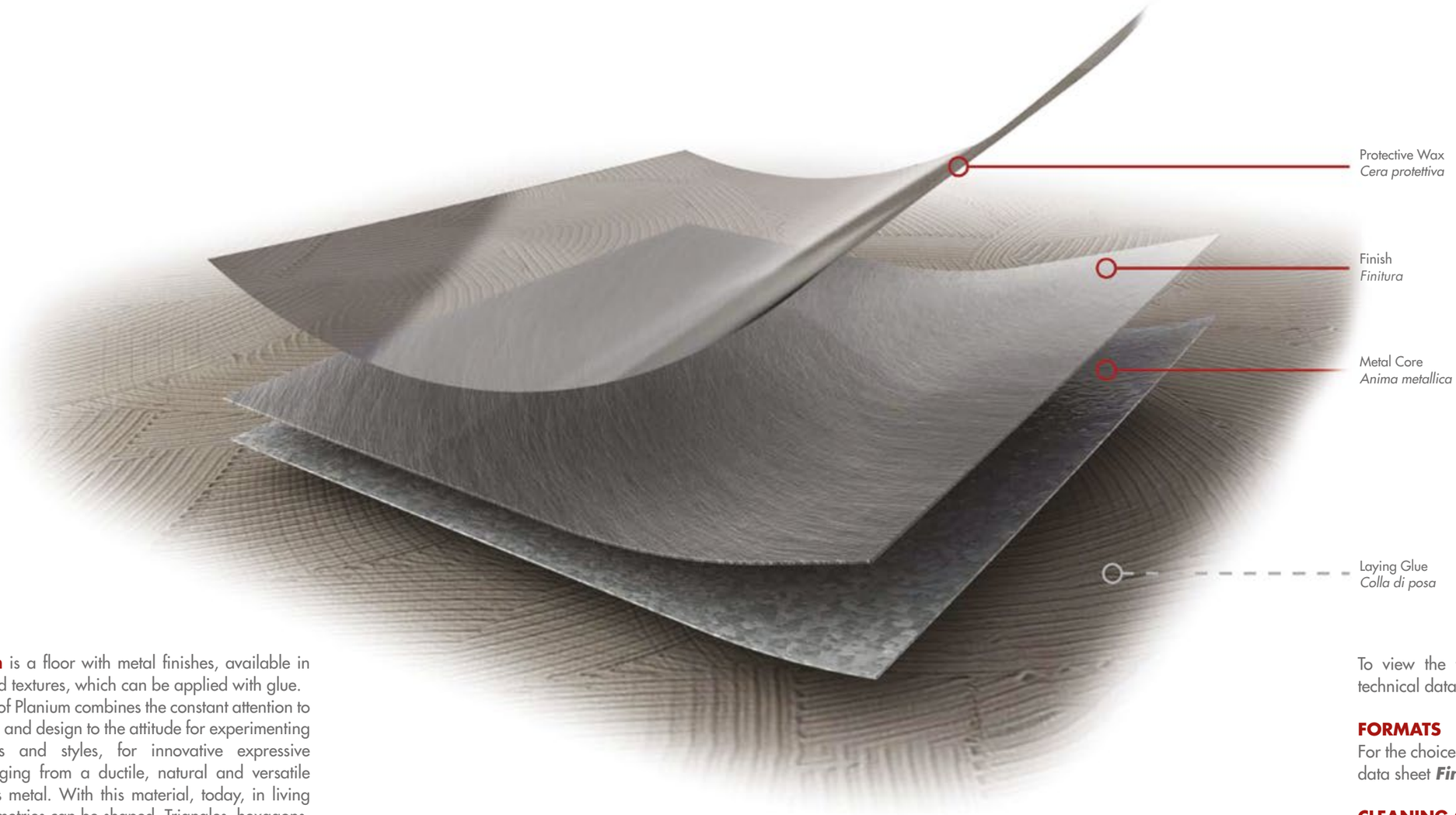


FLOORINGS
AND COATINGS

planium
UNIQUE SURFACES

AC01 - STICK-ON

Floor with glue adhesive coating.



AC01 Stick-on is a floor with metal finishes, available in different sizes and textures, which can be applied with glue.
The creative soul of Planium combines the constant attention to quality, aesthetics and design to the attitude for experimenting with new codes and styles, for innovative expressive languages, springing from a ductile, natural and versatile material, such as metal. With this material, today, in living spaces, new geometries can be shaped. Triangles, hexagons, diamonds, squares and rectangles are drawn on the surfaces, thanks to the combination of different colors and textures.
It is thus possible to create floors of great visual impact, or to emphasize delimited areas, such as "carpets" with geometric decoration. Traditional, retro or modern, contemporary combinations are born; essential and sober solutions or, on the contrary, with lively movement effects. The color palette proposed ranges from the silvery tones of steel to the warm ones, golden brass and bronze, to the red notes of copper, to the dark and unique nuances of the calamine, up to the brown or anthracite shades of oxidized steels. The presented textures extend, creating smooth or raised, natural, brushed, satin or even oxidized surfaces. The modular tiles have, in all the offered geometries, a minimal thickness, resulting therefore very light and easy to apply.

DESCRIPTION

Floor with metal finishes, which can be laid on screed.
The tiles consist of a galvanized steel core, covered with finishes in different metals and textures.

INSTALLATION

The foamed galvanized steel core placed under the finish, provides the tile with strength and solidity with a minimum weight and a millimeter thickness, optimal characteristics for a quick and simple installation.

*We recommend *Adesilex* G20, Mapei (two-component epoxy-polyurethane adhesive, low viscosity and high seal) or *Superflex* eco, Kerakoll (eco-friendly organic mineral adhesive, elastic for high-resistance laying. Ideal for Green Building).

FINISHES

You can choose different finishes in natural or worked metal, among:
- stainless steels (various textures);
- oxidized steels (various textures);
- calamine steel;
- copper (various textures);
- brushed bronze;
- brass (various textures);
- stainless concrete.

To view the types of different finishes proposed, see the technical data sheet ***Finishing Materials***.

FORMATS

For the choice of tile size and dimension, refer to the technical data sheet ***Finishing Materials***.

CLEANING OF SURFACES

For information on cleaning and maintenance of the finishes, see the technical data sheet ***Finishing Materials***.

TESTS AND CERTIFICATIONS

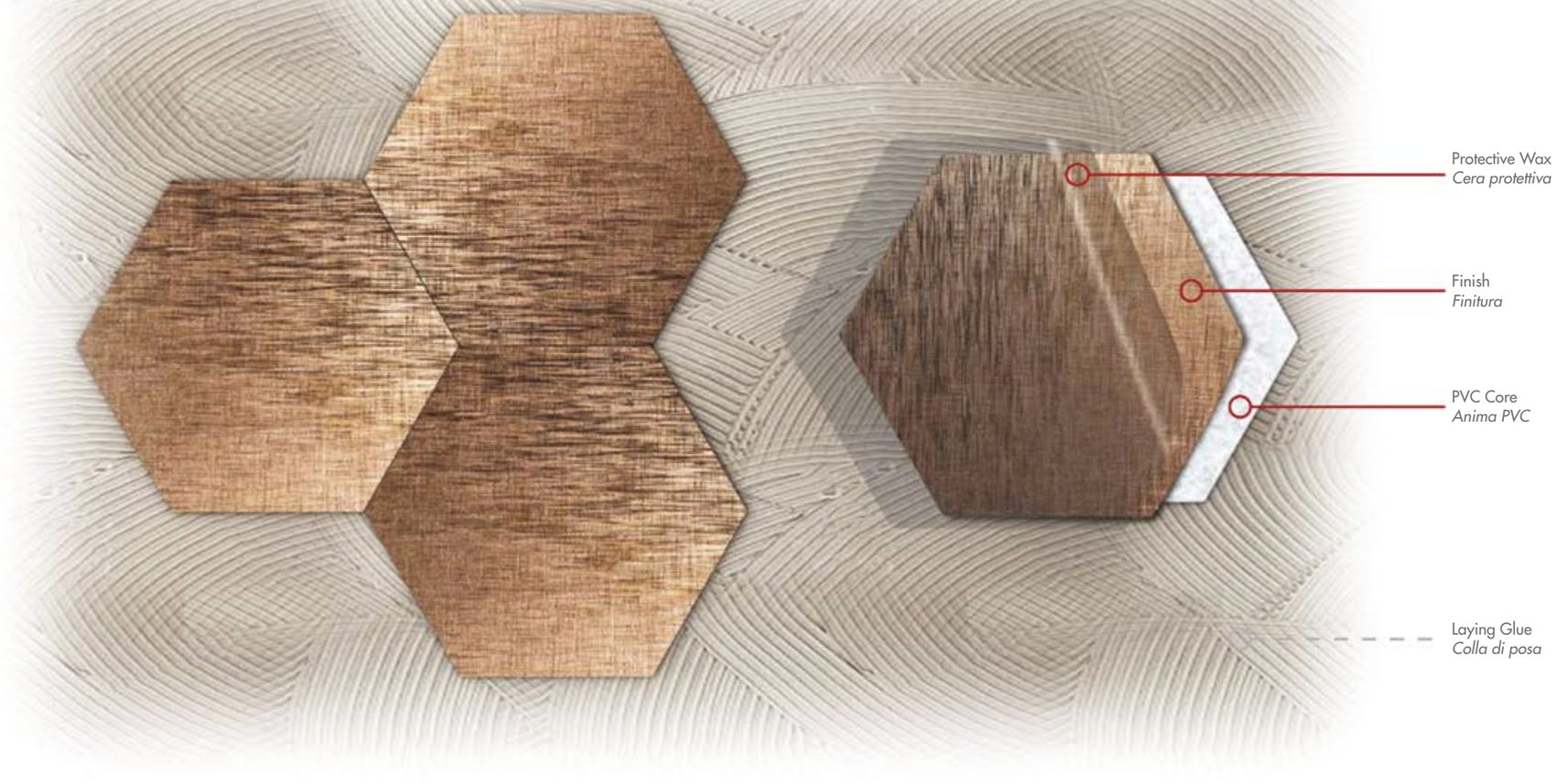
To find technical information on the characteristics of the materials, see the technical data sheet ***Finishing Materials***.

SUSTAINABILITY

Planium selects the raw materials it uses to make its flooring and wall systems, with the concepts of quality, environmental protection, safety, conservation of resources and recyclability. All the materials used are free of substances, that are harmful to health and the environment. Planium systems are designed to add comfort to the rooms, in which they are installed and guarantee, in the production processes with which they are made, a low environmental impact.
AC01 Stick-on was designed in compliance with the principles of an eco-friendly project. The materials used, metal and foamed PVC, are polyvalent: durable, resistant and recyclable.

AC02 STICK-ON

Wall covering with glue adhesive coating.



AC02 Stick-on is a coating composed of metal tiles proposed in different sizes and finishes. Thanks to the clever coupling of sizes and cuts, colors and textures, it is possible to create walls of great visual impact, or emphasize vertical delimited areas, highlighted by geometric decoration.

Traditional or reminiscent combinations are born of retro or modern, contemporary aesthetics, essential and sober solutions or, on the contrary, with lively movement effects.
Using different metals with distinct shades, bright and strong contrasts are created; if you opt instead for the same tone-on-tone material, but with different textures, you get soft and subtle nuances.

The Planium color palette ranges from the silvery tones of the steels to the warm ones, gilded in brass and bronze, to the red notes of copper, to the dark and unique nuances of the calamine, up to the brown or anthracite shades of oxidized steels.

The proposed textures extend, creating smooth or raised, natural, brushed, satin or even oxidized surfaces.
The modular tiles, made of metal, recyclable material, have a minimal thickness, therefore they are very light and easy to apply.

DESCRIPTION

Coating with metal finishes, which can be laid on any vertical surface suitable for gluing. The tiles, with a light Foamalux White core, covered with finishes in different metals and textures, are applied with a thin layer of glue or other fastening system (eg double-sided adhesive, silicone).

INSTALLATION

The foamed PVC core placed under the finish provides the tile with strength and solidity with a minimum weight and a millimeter thickness, optimal characteristics for a quick and simple installation*.

*We recommend *Adesilex* G20, Mapei (two-component epoxy-polyurethane adhesive, low viscosity and high seal) or *Superflex* eco, Kerakoll (eco-friendly organic mineral adhesive, elastic for high-resistance laying. Ideal for Green Building).

FINISHES

You can choose different finishes in natural or worked metal, among:
- stainless steels (various textures);
- oxidized steels (various textures);
- calamine steel;
- copper (various textures);
- brushed bronze;
- brass (various textures).

To view the types of different finishes proposed, see the technical data sheet ***Finishing Materials***.

FORMATS

For the choice of tile size and dimension, refer to the technical data sheet ***Finishing Materials***.

CLEANING OF SURFACES

For information on cleaning and maintenance of the finishes, see the technical data sheet ***Finishing Materials***.

TESTS AND CERTIFICATIONS

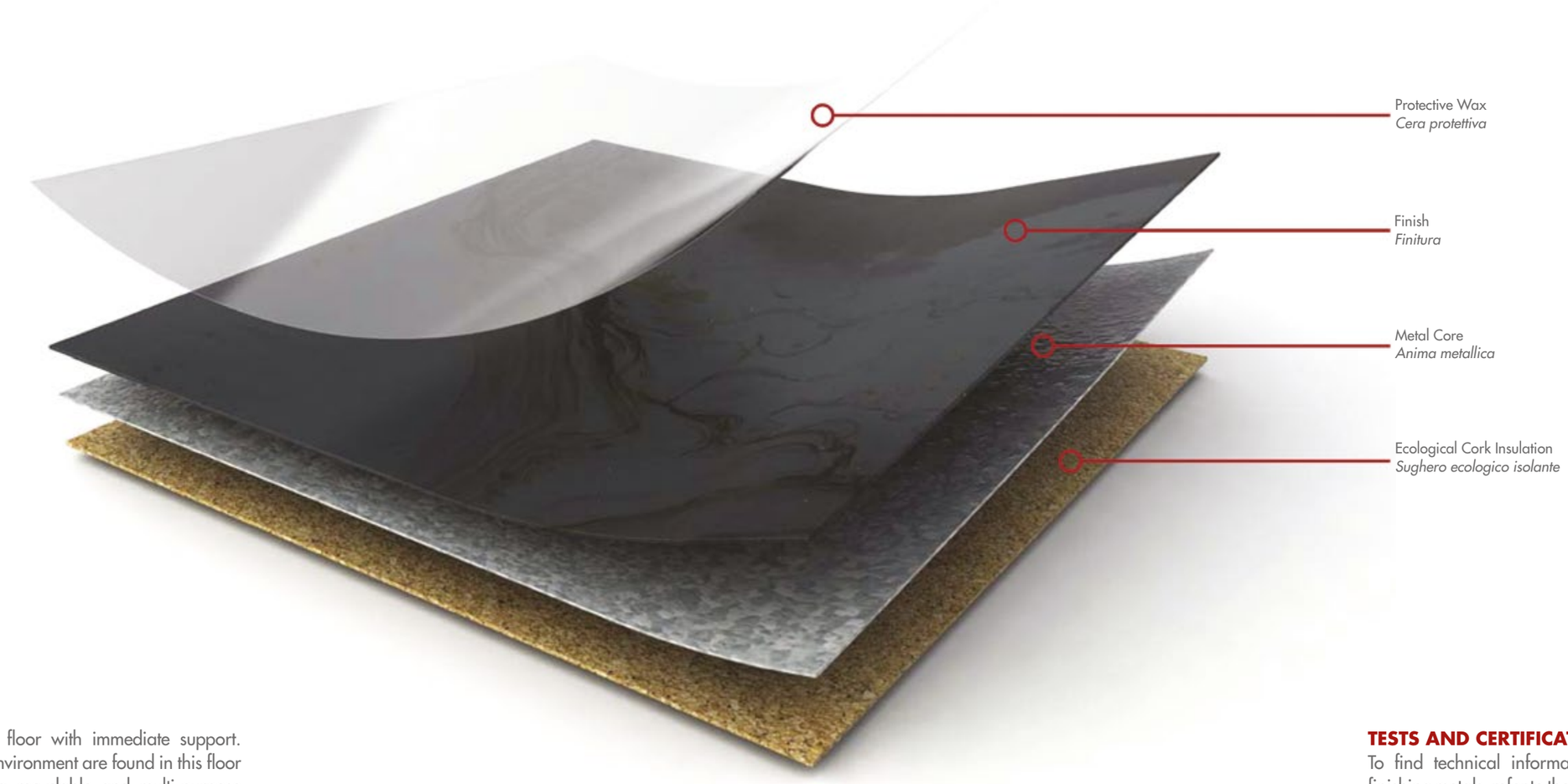
To find technical information on the characteristics of the materials, see the technical data sheet ***Finishing Materials***.
Foamalux White, the soul of the tile, is a very thin, latest-generation, rigid foam PVC sheet, that is extremely light, resistant and self-extinguishing.

SUSTAINABILITY

Planium selects the raw materials it uses to make its flooring and wall systems, with the concepts of quality, environmental protection, safety, conservation of resources and recyclability. All the materials used are free of substances, that are harmful to health and the environment. Planium systems are designed to add comfort to the rooms, in which they are installed, and guarantee, in the production processes with which they are made, a low environmental impact.
AC02 Stick-on was designed in compliance with the principles of an eco-friendly project. The materials used, metal and foamed PVC, are polyvalent: durable, resistant and recyclable.

AP01 - LAY

Self-laying supporting floor.



AP01 Lay is a self-laying floor with immediate support. Comfort and attention to the environment are found in this floor with elegant metal finishes, a recyclable and multi-purpose material, proposed in different shades and design textures. The tiles, in various sizes and geometries, have a minimal thickness; they can be laid with a single gesture and walked on immediately. They can be placed on screed or on old floors that you prefer not to demolish, but covered. All with a particular attention also to the containment of labor costs.

DESCRIPTION

Floor with metal finishes and fast laying on the floor, executable on:
- screed;
- another floor you wish to cover;
- floating technical floor.

The metal finishes, with a galvanized steel core, have a natural, recyclable cork underlay.

INSTALLATION

The installation of the tiles cannot be simpler and more immediate than this: just a gesture, a quick laying, without glues, without fixings, with labor costs reduced to a minimum. The underlying ecological cork has a minimal thickness and it is integral with the back of the tile. The absence of installation glues and the total reversibility of the floor, together with the recyclability and naturalness of the materials used, ensure that the AP01 Lay system has optimal eco-sustainable characteristics.

FINISHES

You can choose different finishes in natural or textured metal among:
- stainless steels (various textures);
- calamine steel;
- oxidized, brushed steel;
- stainless concrete.

To view the types of different finishes proposed, see the technical data sheet ***Finishing Materials***.

FORMATS

To find out about the sizes and formats of the tiles, refer to the technical data sheet ***Finishing Materials***.

CLEANING OF SURFACES

For information on cleaning and maintenance of the finishes, see the technical data sheet ***Finishing Materials***.

TESTS AND CERTIFICATIONS

To find technical information on the characteristics of the finishing metals, refer to the data sheet ***Finishing Materials***. The ecological cork on the back of the tiles has insulating and sound-absorbing properties.

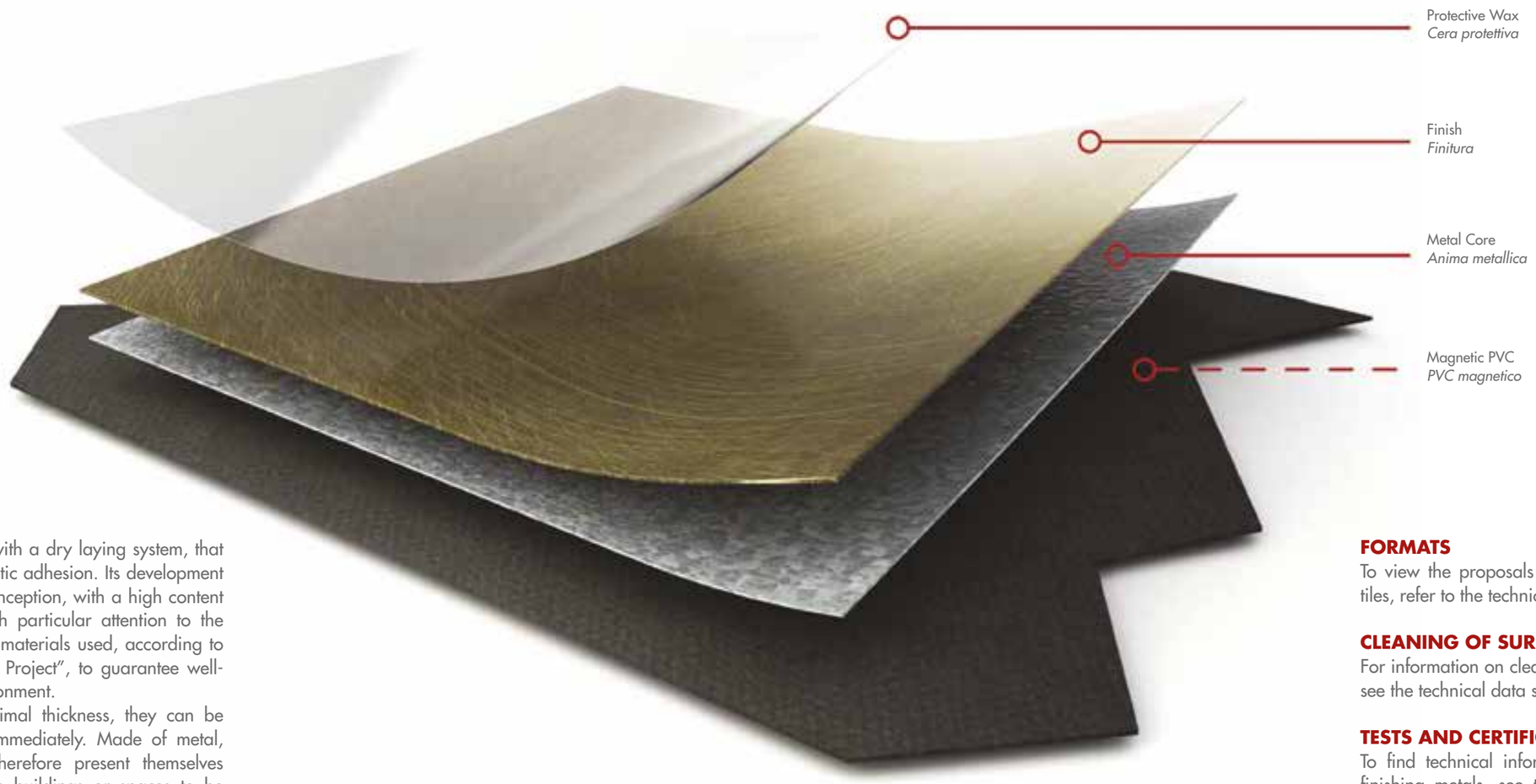
SUSTAINABILITY

Planium selects the raw materials it uses to make its flooring and wall systems, with the concept of quality, environmental protection, safety, conservation of resources and recyclability. All the materials used are free of substances that are harmful to health and the environment. Planium systems are designed to add comfort to the spaces, in which they are installed and guarantee, in the production processes, with which they are made, a low environmental impact.

AP01 Lay has been designed in compliance with the principles of an eco-compatible project: the reversible installation, which can be made just laying the tiles, does not damage the environment and makes disposal and recycling simple.
The finishing tiles of the various collections in the catalogue are all in metal, an ancient, natural and recyclable material. The underlaying cork makes the floor even more performing and natural.

MG01 - MAGNETIC

Magnetic self-laying floor.



MG01 Magnetic is a floor with a dry laying system, that can be installed through magnetic adhesion. Its development has followed criteria of new conception, with a high content of technology and design, with particular attention to the functionality and quality of the materials used, according to the criteria of the "Sustainable Project", to guarantee well-being and attention to the environment.
The modular tiles have a minimal thickness, they can be quickly laid and walked on immediately. Made of metal, a recyclable material, they therefore present themselves as the ideal solution for green buildings or spaces to be renovated; they can be placed on a screed or on old floors, that cannot be demolished but covered. The fast, totally dry installation also allows full reversibility in just as fast times. All with a particular attention also to the containment of labor costs.

DESCRIZIONE

Self-laying technical flooring system with metal finishes and rapid magnetic support laying, executable on:
• screed;
• another floor you wish to cover;
• floating technical floor.
In the name of **MG01 Magnetic** its most salient feature is immediately evident: a magnetically laid floor. The laying installation guarantees stability without the use of glues, as the metal tiles, with a galvanized steel core and metal finishes and a choice of textures, are naturally attracted by the magnetic PVC substrate, to which they are fixed. The laying is therefore stable, but also totally reversible.

INSTALLATION

The thin but resistant modular tiles are easy and quick to be installed; they are also completely reversible in a precise manner, since the installation is carried out with a simple support on a magnetic PVC "carpet", with an equally minimal thickness, which can be cut to size in a simple and practical way.
The absence of laying adhesives and the total reversibility of the floor, together with the recyclability of the materials used, ensure that the system has optimal eco-sustainable characteristics.

FINISHES

You can choose different finishes in natural or textured metal among:
• stainless steels (various textures);
• oxidized steels (various textures);
• calamine steel;
• copper (various textures);
• brushed bronze;
• brass (various textures);
• stainless concrete.
To view the types of different finishes proposed, see the technical data sheet ***Finishing Materials***.

FORMATS

To view the proposals of sizes and dimensions of modular tiles, refer to the technical data sheet ***Finishing Materials***.

CLEANING OF SURFACES

For information on cleaning and maintenance of the finishes, see the technical data sheet ***Finishing Materials***.

TESTS AND CERTIFICATIONS

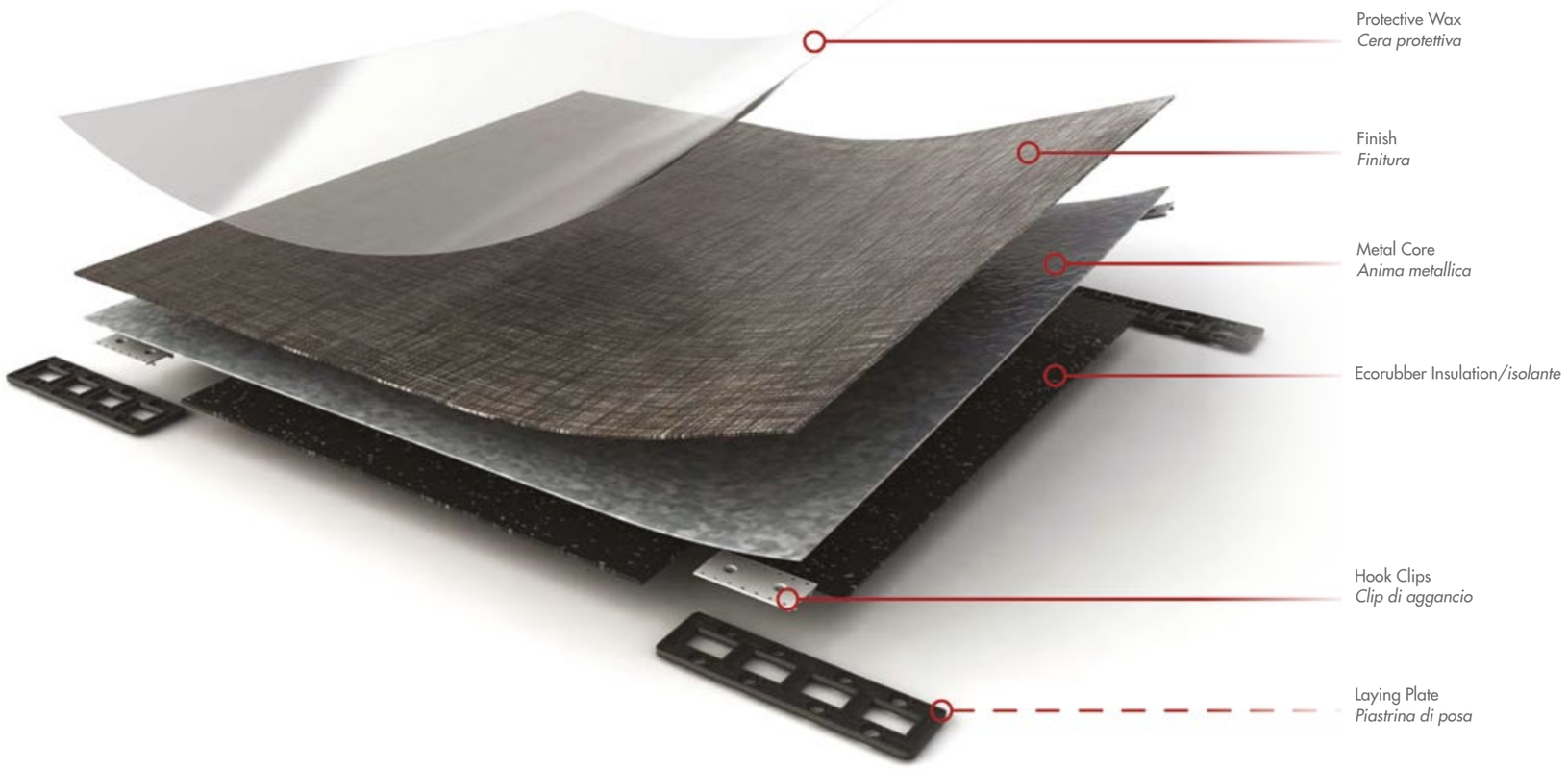
To find technical information on the characteristics of the finishing metals, see the ***Finishing Materials*** technical data sheet. The magnetic PVC, to be used as a laying substrate, consists of a mixture of magnetic powder in ferrite and plastic or synthetic rubber. It has permanent magnetism, good flexibility and can be easily cut to size.

SUSTAINABILITY

Planium selects the raw materials it uses to make its flooring and wall systems, with the concepts of quality, environmental protection, safety, conservation of resources and recyclability. All the materials used are free of substances that are harmful to health and the environment. Planium systems are designed to add comfort to the rooms, in which they are installed and guarantee, in the production processes with which they are made, a low environmental impact. **MG01 Magnetic** has been designed respecting the principles of the eco-compatible project: the reversible laying, totally dry, without glues, does not damage the environment and makes disposal and recycling simple. The finishing tiles of the various collections in the catalog are all in metal, an ancient, natural and recyclable material.

PL01 - INVISIBLE

One-click self-laying floor.



PL01 Invisible is a technical floor with a dry laying system. This is done by one-click coupling between tiles. According to the criteria of the "Sustainable Project", guaranteeing well-being and attention to the environment, the one-click coupling system ensures that the installation is simple, immediate and effective, as well as reversible, if necessary.

The elegant finishes in metal, recyclable and multi-purpose material, proposed in different textures, have a minimal thickness, can be quickly laid, reducing labor costs, and immediately walkable.

They can be placed on screed or on old floors that you wish to cover, avoiding the inconveniences and the costs of demolition and disposal.

DESCRIPTION

Floor with metal finishes and rapid one-click installation on:
- screed;
- another floor you wish to cover;
- floating technical floor.

The patented one-click coupling is not invasive for the subfloor. The fixing takes place on the back of the tiles, therefore invisible on the surface.

INSTALLATION

The absence of laying adhesives and the total reversibility of the floor mean that the PL01 Invisible system has optimal eco-sustainable characteristics. The one-click fastening adopted is perfect: stable, but also reversible. The rubber substrate attached to the tiles guarantees further stability and optimal sound absorption values. The coupling between tiles takes place by means of a pressure clip.

FINISHES

You can choose different finishes in natural or textured metal among:
- stainless steels (various textures);
- calamine steel;
- oxidized, brushed steel;
- stainless concrete.

To view the types of different finishes proposed, see the technical data sheet ***Finishing Materials***.

FORMATS

To view the proposals of sizes and dimensions of modular tiles, refer to the technical data sheet ***Finishing Materials***.

CLEANING OF SURFACES

For information on cleaning and maintenance of the finishes, see the technical data sheet ***Finishing Materials***.

TESTS AND CERTIFICATIONS

To find technical information on the characteristics of the finishing metals, see the technical data sheet ***Finishing Materials***. ECORUBBER®, used as the foundation of the tiles, is an agglomerate of high density vulcanized rubber granules. It is an excellent sound absorbent and anti-vibration, it is resistant to high and low temperatures.

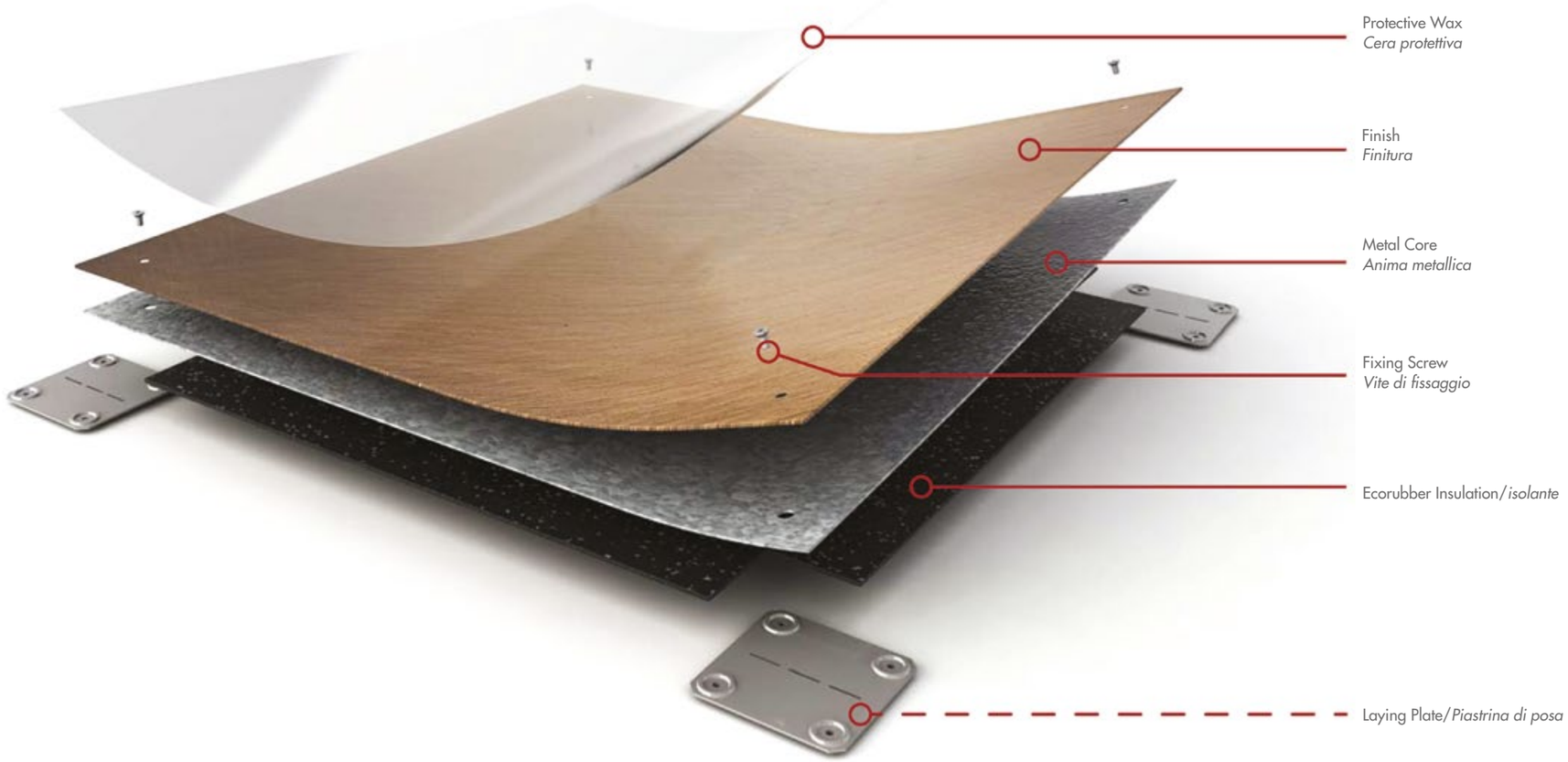
SUSTAINABILITY

Planium selects the raw materials it uses to make its flooring and wall systems, with the concept of quality, environmental protection, safety, conservation of resources and recyclability. All the materials used are free of substances that are harmful to health and the environment. Planium systems are designed to add comfort to the rooms, in which they are installed, and guarantee, in the production processes with which they are made, a low environmental impact.

PL01 Invisible was designed in compliance with the principles of the eco-compatible project: the reversible installation, totally dry, without glues, does not damage the environment and makes disposal and recycling simple. The finishing tiles of the various collections in the catalogue are all in metal, an ancient, natural and recyclable material.

SM02 - EVOLUTION

Self-laying floor with mechanical coupling.



SM02 Evolution is a technical floor with a dry laying system. This is done by means of a support and mechanical coupling between tile and tile.
The angular screw coupling system ensures that the installation is simple, fast and effective, as well as reversible if necessary. The technical detail of the visible screw characterizes the design of the metal finishes, modern and recyclable, proposed in different shades and textures. The tiles have a minimal thickness, they can be laid quickly, reducing labor costs, and they can be walked on immediately. They can be placed on screed or on old floors that you wish to cover and preserve, avoiding the inconveniences and costs of demolition and disposal.

DESCRIPTION

Floor with metal finishes and fast mechanical installation on:
- screed;
- another floor you wish to cover;
- floating technical floor.

The mechanical coupling is not invasive for the subfloor: in fact, it is only fixed to the back of the tiles. The corner screws, technical and aesthetic detail of the system, guarantee a reversible installation.

INSTALLATION

The absence of laying adhesives and the total reversibility of the floor mean that the SM02 Evolution system has excellent eco-sustainable characteristics. The fastening adopted, angular screw, is perfect: stable, but also reversible. The rubber substrate attached to the tiles guarantees further stability and optimal sound absorption values.

FINISHES

You can choose different finishes in natural or textured metal among:
- stainless steels (various textures);
- calamine steel;
- oxidized, brushed steel;
- stainless concrete.

To view the types of different finishes proposed, see the technical data sheet ***Finishing Materials***.

FORMATS

For information on the proposed sizes and dimensions of modular tiles, refer to the technical data sheet ***Finishing Materials***.

CLEANING OF SURFACES

To find out how to clean and maintain the finishes, see the data sheet ***Finishing Materials***.

TESTS AND CERTIFICATIONS

To find technical information on the characteristics of the finishing metals, see the technical data sheet ***Finishing Materials***. ECORUBBER®, used as the foundation of the tiles, is an agglomerate of high density vulcanized rubber granules. It is an excellent sound absorbent and anti-vibration, it is resistant to high and low temperatures.

SUSTAINABILITY

Planium selects the raw materials it uses to make its flooring and wall systems, with the concept of quality, environmental protection, safety, conservation of resources and recyclability. All the materials used are free of substances that are harmful to health and the environment. Planium systems are designed to add comfort to the environment in which they are installed and guarantee, in the production processes with which they are made, a low environmental impact.
SM02 Evolution has been conceived respecting the principles of the eco-compatible project: the reversible laying, completely dry-running, without adhesives, does not damage the environment and makes disposal and recycling simple. The finishing tiles of the various collections in the catalog are all in metal, an ancient, natural and recyclable material.

MR01 - MODULO RADIANTE

Radiant Raised Floor.

MR01 Modulo Radiante was born as an innovative solution to the current need to have a raised floor and a radiant system in a single product. In fact, the separable modules are equipped with a hydronic system integrated into the panel. This combination makes it possible to reconcile the multiple technical requirements, that are increasingly presented in the setting up of green buildings and buildings to be renovated (the necessity to keep the plants and the network cables inspectable, the urgency not to interrupt work activities, the request of flexibility in the organization of workstations, etc.), without sacrificing high thermal comfort performance and excellent stylistic result.

MR01 Modulo Radiante is, in fact, developed according to new concept criteria, with a high content of **technology** and **design**, with particular attention to the **functionality** and **quality** of the materials used, according to the criteria of the "sustainable project", to guarantee wellbeing and attention to the environment.
The System adopts **modularity** as a model of thinking and design for the optimization of the production, storage and logistics and also the installation phases. It gives climate and acoustic **comfort** to the environments. It opts for a **totally dry fast installation**, that eliminates the demolition and disposal of the rubble stages. It allows the maintenance of the total inspectionability of the underlying cavity. All with particular attention to **containing the consumptions**.

DESCRIPTION

Radiant raised flooring system with combinable modules, which can be installed on:
- screed;
- another floor that you wish to cover.

MR01 Modulo Radiante is an innovative floating technical floor that guarantees total access to the systems (laying of cables, inspectability, changes in the layout of spaces, etc.) and at the same time the unparalleled comfort of the floor heating/cooling, through the hydronic radiant system inserted in the modules. Strengths are the rapidity of installation and the rapidity of the system set-up (thanks to which it is also possible to use it on-off like a traditional radiator), given by the speed of installation of quick couplings and by the limited thickness of the package heating.

INSTALLATION

The installation must be carried out according to the indications of the specific thermo-technical project and with the support of the documentation for the installation. The thermotechnical project evaluates the environmental characteristics and the performance requirements, consequently the optimal distribution on the surface of the radiant modules, in order to obtain maximum comfort. The installation is totally dry, it is reversible and leaves the possibility of a punctual inspection of the underlying cavity.

FINISHES

The System is supplied with finishing/closing of galvanized steel panels. If you wish to apply Planium metal finishes, you can choose from those in the catalog (see data sheet *Finishing Materials*) or you can lay other materials, according to the client's choice or Planium loose-lay floors or other suppliers' ones.

FORMATS

For all the dimensional aspects of Planium materials, refer to the the data sheet *Finishing Materials*.

CLEANING THE SURFACES

For information on how to clean and maintain the finishes, see the data sheet *Finishing Materials*.

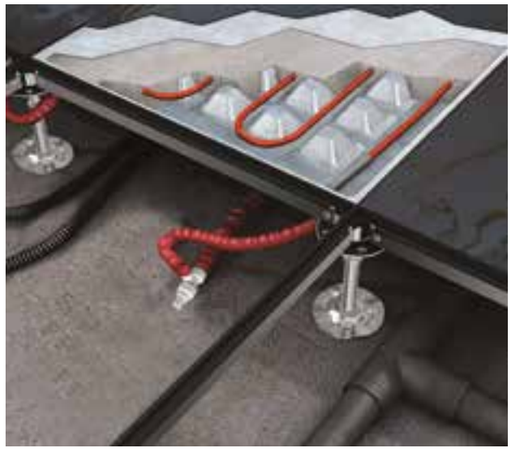
TESTS AND CERTIFICATIONS

For technical information on finishing materials, read the data sheet *Finishing Materials*.

ENVIRONMENTAL SUSTAINABILITY

Planium selects the raw materials it uses to realize its flooring and coating systems, with the concept of quality, environmental protection, safety, conservation of resources and recyclability. All the materials used are free of substances harmful to health and environment. The Planium systems are designed to add comfort to the environment in which they are installed and ensure, in the production processes with which they are made, a low environmental impact.

MR01 Modulo Radiante has been designed respecting the principles of the eco-friendly project: the module/tile consists of a set of elements assembled together by screws, to allow easy disassembly of the parts at the end of floor life and thus obtain the separation of the individual materials for their recycling. The matching Planium finishes are all in metal, a material with high recyclability and conduction.



SPECIFICATIONS

MR01 Modulo Radiante consists of radiant, raised and removable modules. It is particularly suitable for offices and/or environments, where a raised floor is required (due to the need for short installation times, passage/inspection of underlying electrical cables and flexibility in the organization of spaces).
On the system it must be possible to apply different types of finishes, also customizable and supporting structures (such as movable walls) made by specialized companies. The surface temperature must correspond to the hygienic and physiological needs, respecting the maximum limit of 29°C. The system components must comply with the UNI EN ISO and/or DIN standards that apply to them, as specified below.

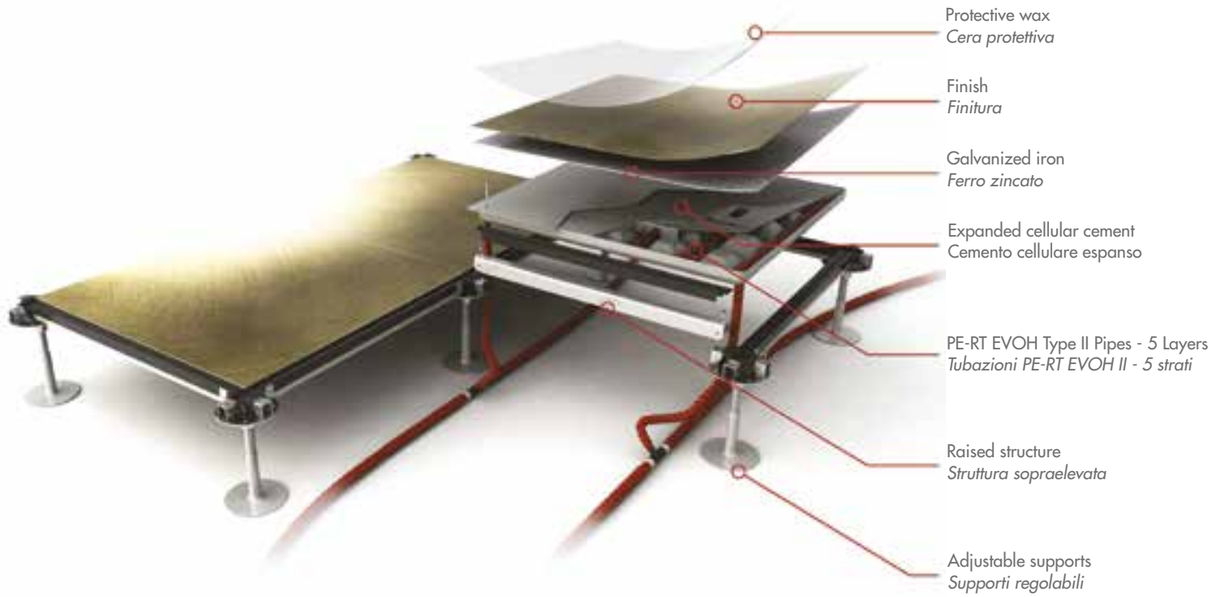
The module consists of a steel containment basin. Inside it houses the John Guest PE-RT EVOH Type II, 5-layer piping, produced according to EN ISO 22391 and DIN 4726 Standards, 10 mm external diameter with a wall thickness of 1.5 mm, thermal conductivity equal to 0.400 W/mk, coefficient expansion with heat equal to 0.0200 mm/mK. The pipe is equipped with an oxygen barrier useful to guarantee a maximum permeation value <0.1 mg/l day, at the maximum temperature of 70°C and at the maximum pressure of 4 bar.
In compliance with ISO 22391, the pipe is suitable for working according to the following operating classes/pressures: class 1/10 bar, class 2/8 bar, class 4/10 bar, class 5/8 bar. In compliance with the ISO Standards of reference, the tube has been designed to ensure a duration of not less than 50 years; the tube is covered by a 10-year warranty.

The length of the pipe is such as to guarantee uniformity of surface temperature and at the same time the thermal power required in the project. The core and the tubing are covered by lightweight foamed cellular cement with densities that can vary from 600 to 1.400 Kg/m^3 according to project specifications. The module is complete with a galvanized steel metal cover that guarantees the top and perimeter closure. The module supply and return lines, made with John Guest PE-RT EVOH Type II 5-layer piping, equipped with insulating sheath in expanded polyethylene, having a minimum thickness of 6 mm and characterized by a thermal conductivity coefficient λ + 40°C = 0.040 (m*K); they are in detectable length on the executive design of the project, as well as the maximum number of modules powered by each line and connected in series between them.

The supply includes, when necessary, the insulating mat in fiberglass treated with thermosetting resins and covered with aluminized Kraft paper (λ equal to 0.036 W/m·K), to be placed on the screed or floor on which the radiant raised element is made, in so as to reduce the transmission of heat by radiation (recommended thickness 100 mm ÷ U = 0.33 W/mq K) in the cavity below the floor. The system is supplied complete with: radiant modules, isolated outward/return distribution lines, SPEEDFIT John Guest quick-fit connectors both for fixing the distribution lines (in accordance with the rules of the art) and for inserting the modules to the distribution line (designed and built according to current regulations). The system is supplied with documentation certifying the yield, determined by numerical simulations of the finished differences according to EN 15377.

MR01 - MODULO RADIANTE

Radiant Raised Floor.



SPECIFICATIONS OF THE RAISED SYSTEM

Self-supporting structure: consisting of support foot with circular base (Ø 100 mm), threaded stem, cross head and joint crosspieces, with micrometric adjustment for defining the height of the gap.
Modular panel: in standard size of 600 x 600mm, in which the piping is functional for the thermal adduction. Finishing or any self-laying system can be applied to the panel.

Salient features:
- high performances;
- minimum height, unlimited maximum height;
- punctual inspection;
- low thickness of the radiant panel;
- low energy consumption and reduced inertias;
- maximum climatic and acoustic comfort;
- great flexibility of the system.

RADIANT PANEL SPECIFICATIONS

Dimensions: 600 x 600 mm +/- 0.1 mm
Diagonals: 848.5 mm +/- 0.1 mm
Thickness: 32 mm +/- 0.1 mm
Weight: 17.5 (1,400 kg/mc)
Weight for m²: 49.0 Kg +/-5%
Weight: 9.2 (600 kg/mc) +/-5%
Weight for m²: 26.0 kg +/-5%
Active surface: 0.36 (m²)
Maximum load loss: 1.7 (mbar)
Maximum thermal power (heating): 97 W/m² (35 W/module)
Maximum thermal power (cooling): 26 W m² (10 W/module)
Transverse electrical resistance: 1.2 x 1010 ohm
Noise level at foot traffic: 23 db
Fire resistance: REI 45*
Self-extinguishing head cross-member gaskets: V0
Reaction to fire: class I*
Mechanical resistance: class 5/A***

*Data referring to the mechanical structure consisting of feet, crosspieces and panels, pipes excluded.

**Use in areas subject to heavy loads: libraries, industrial floors for offices, warehouses, offices, etc.).
N.B. The above characteristics, referred to the raw panel, may vary according to the possible finish.

SETTING UP OF THE RADIANT SYSTEM

Instrumental and thermographic analysis of the ignition and steady state phases of the radiant system. Summary of the main data:

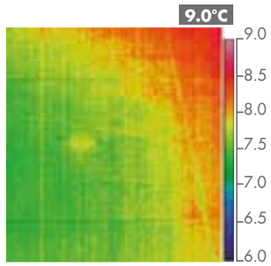
1 The study was carried out in the winter period (25 January) at a commercial space in the Bolzano province, with external temperature at the start of the test of 3.8°C, and maximum outdoor daytime temperature of 9.2°C.

2 The system (heat pump generator) was re-started at 10.30 a.m. with constant delivery regulation at 40°C; the entry time of the delivery was about 1 hour.

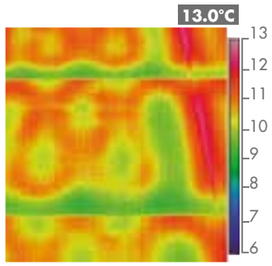
3 Instrument measurements and data collection were performed at 5-minute intervals after the system was turned on for a period of 8 hours (5 hours of constant delivery and 3 hours with the system off).

4 Room air temperature detection:
- **a** survey at 10.30 a.m. (plant off): T environment air 9.1°C;
- **b** detection at 2.30 p.m.: T environment air 18.2°C;
- **c** detection at 3.15 p.m.: T room air 19.2°C;
- **d** detection at 4.00 p.m.: T environment air 20.1°C.

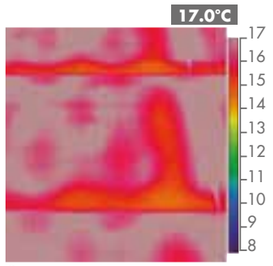
THERMOGRAPHIC IMAGES AND TEMPERATURE DATA (MODULE AND AIR SURFACE)



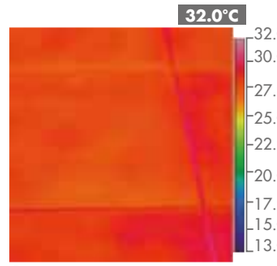
1
Plant off:
T average surface module 7.7°C.



2
20 min. after switching on:
T average surface module 10.7°C.



3
75 min. after switching on:
T average surface module 16.8°C.



4
4 hours after switching on:
T average surface module 28.1°C.

The performance of a radiant system is determined by the difference between the operating temperature of the environment, in which it act, and the average temperature of the radiating surface. The greater the radiant modules involved in supplying the energy needed to heat the rooms and the greater the active surface and consequently the surface temperature necessary for the purpose (with the consequent health benefits) and the waiting time to reach the ideal comfort temperature is lower, with excellent energy and consumption savings.

Heating.
The maximum power is 97 W/m² with a uniform surface temperature of 29°C (corresponding to 35 W per module).
This power is produced under standard conditions with inlet water temperatures varying between 35 ÷ 40°C; this variability is linked to the type of finish chosen as the covering of each module and to the performance characteristics of the building envelope. The number of radiant modules and their allocation must be carefully evaluated during the design phase, not only to guarantee the comfort ambient temperature through the lowest surface temperature, but also to ensure that the set-up times are compatible with the user's needs.

Cooling.
The maximum power that can be supplied is 26 W/m² with an input water temperature of 18°C. To avoid condensation, it is advisable to treat the air using, for example, air conditioners or dehumidifiers.

Specific Heat Requirement	**30 W/m²***	**40 W/m²***	**50 W/m²***	**60 W/m²***	**70 W/m²***	**80 W/m²***
W/m²	**20°C** Environment Temperature **5 K** Thermal Difference					
Flow temperature based on UNI EN 1264-3: 2009; yield curves determined numerically according to UNI EN 15377						
	27	29	31	32	34	36
Floor Temperature	**10,8 W/m² K** U warm floor according to UNI EN 1264-2: 2009 and UNI EN 1264-5: 2009					
Avarage surface and floor temperature						
	23	24	25	26	26	27

The power lost changes considerably with the constructive solution on which the system is applied. The total power used can be equal to 200% of the needs of the room to be heated if the boundary conditions are more unfavorable up to reduce significantly in the case of adequately isolated structures.

Delivery Temperature	**14°C (51%*)**	**15°C (56%*)**	**16°C (60%*)**	**17°C (64%*)**	**18°C (68%*)**	**19°C (71%*)**
W/m²	**26°C** Environment temperature **3,1 K** Temperature difference determined assuming that the hot and cold demand ratio is equal to 1.5: 1					
W/m² subtracted from the environment in cooling, determined numerically according to EN15377						
	41	37	33	29	25	22
Floor Temperature	**6,5 W/m² K** Alfa cold floor according to UNI EN 1264-5: 2009					
Average surface and floor temperature						
	19,7	20,3	20,9	21,5	22,1	22,7

According to UNI EN 1264-3 the delivery temperature must not be lower than 1K below the dew-point value, calculated on ambient conditions in the presence of a dehumidification system (for example: with 26°C ambient and relative humidity of 51%, the dew point temperature is 15°C; the delivery temperature can be 14°C, but not lower).

Planium S.r.l. with passion and knowledge gives form to ideas, to creative projects refined, elegant, unique; we use technological innovation with experience, to give life to new surfaces, new contemporary environments. We shape metal, modeling it to measure, according to the tastes of the client, taking care of it in detail, giving importance to quality and sustainability.
Planium flooring and coating systems are, therefore, created: functional in installations, elegant in finishes, unique in this prestigious 100% made in Italy combination.

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