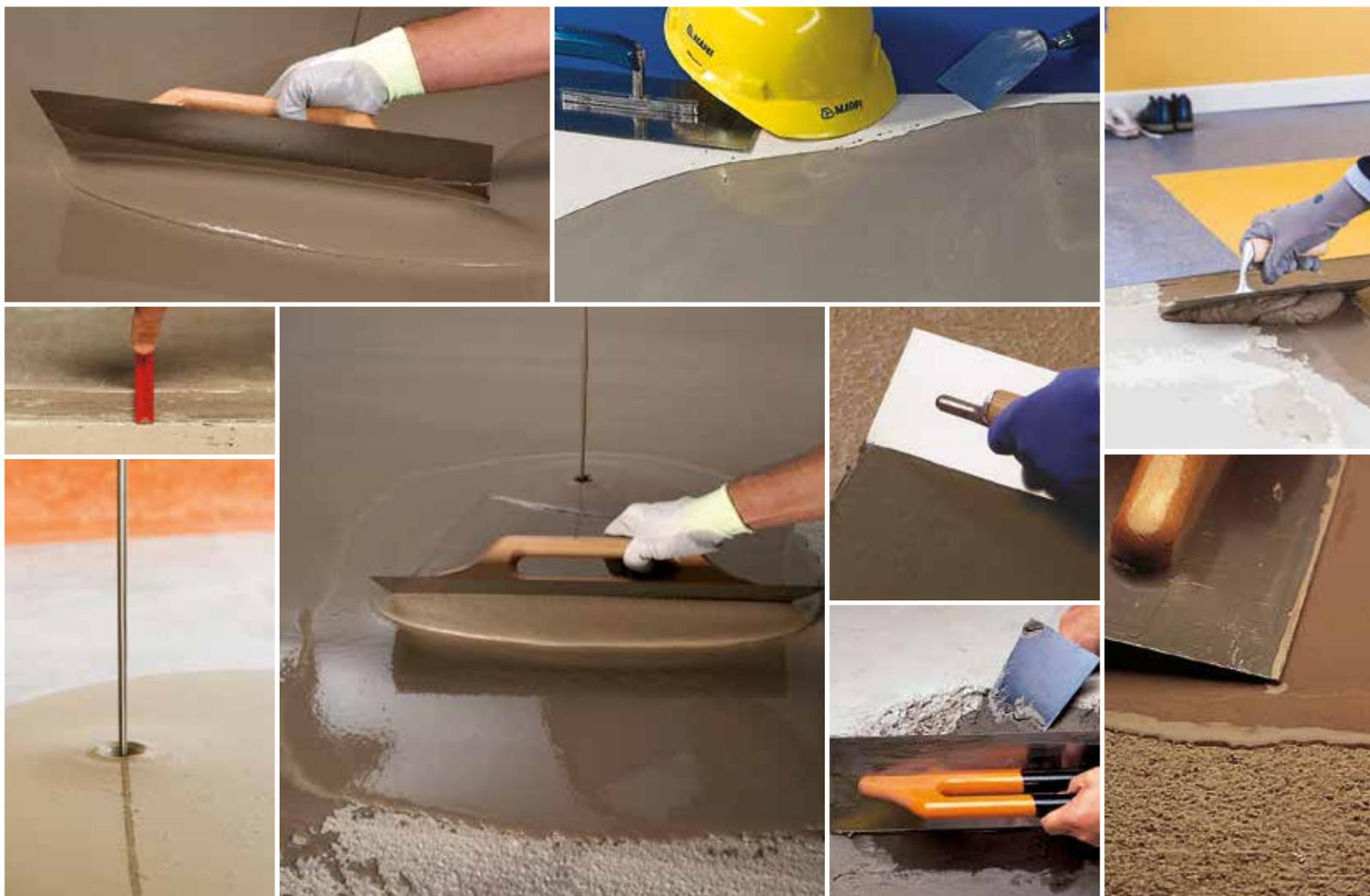
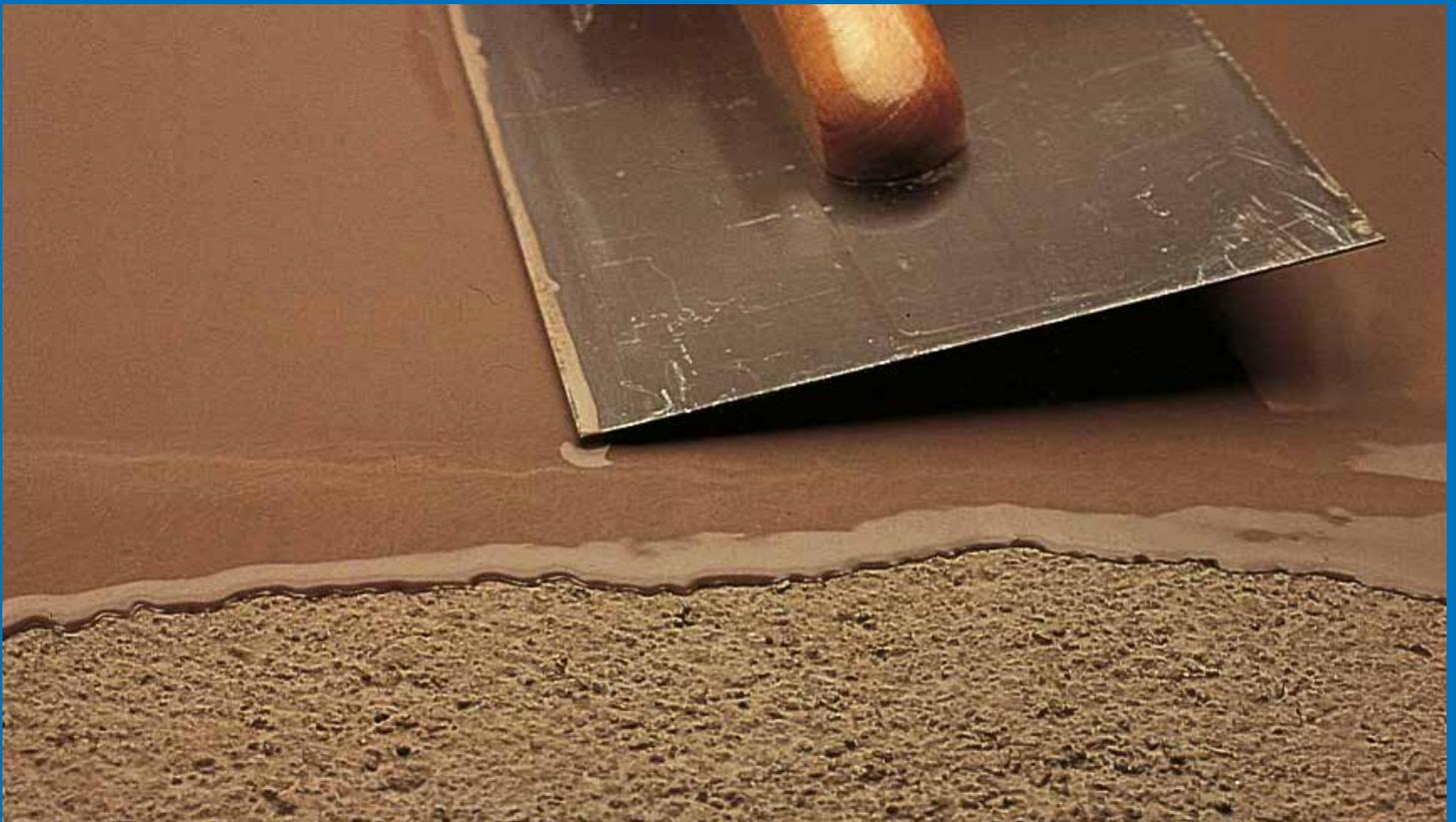


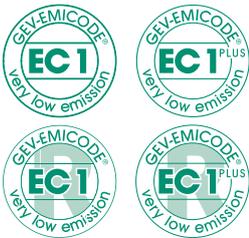
A GUIDE FOR CHOOSING SELF-LEVELLING AND THIXOTROPIC SMOOTHING COMPOUNDS FOR RESILIENT AND TEXTILE FLOOR-COVERINGS



MAPEI SELF-LEVELLING AND THIXO WITH AN EXTREMELY LOW EMISSION LE



SELF-LEVELLING SMOOTHING COMPOUNDS



MAPEI has always been committed to research and development into products which safeguard the environment, the health of those who use them and of those who use the areas where they are applied, and since 1980, has developed a series of products which emit an extremely low level of volatile organic compounds. These products have been used for decades on sites all over the world for laying resilient and textile floors, and have been certified "EMICODE EC1 - extremely low emission level of volatile organic compounds" and "EMICODE EC1 PLUS - extremely low emission level of volatile organic compounds - Plus" - awarded by GEV (Gemeinschaft Emissionskontrollierte Verlegewerkstoffe Klebstoffe und Bauprodukte e.V.), a German association which controls the emission levels of products used for laying floors, adhesives and other materials used in the building industry. MAPEI's strong commitment to the environment and ECO-SUSTAINABLE buildings has also led the company to provide products with an extremely low level of VOC for installing ceramic tiles, natural stone and wood floorings which are also GEV certified, and which carry the EMICODE EC1 and EMICODE EC1 PLUS seal of approval, which may be found in the catalogue as follows:

MAXIMUM EMISSION LIMITS FOR EC1 AND EC1 PLUS PRODUCTS

	Products EMICODE EC1 Plus	Products EMICODE EC1
Emissions 3 days after laying	TVOC \leq 750 $\mu\text{g}/\text{m}^3$	TVOC \leq 1000 $\mu\text{g}/\text{m}^3$
Emissions 28 days after laying	TVOC \leq 60 $\mu\text{g}/\text{m}^3$ TSVOC \leq 40 $\mu\text{g}/\text{m}^3$	TVOC \leq 100 $\mu\text{g}/\text{m}^3$ TSVOC \leq 50 $\mu\text{g}/\text{m}^3$

The **Green Innovation** symbol identifies products with certain characteristics which contribute to achieve eco-sustainable building:



- products with an extremely low emission level of volatile organic compounds,
- products with an extremely low emission level of dust during the mixing and storage phases,
- products which avoid the formation of mould when applied in damp environments,
- products which help to improve environmental well-being, for example by improving soundproofing against the noise created by foot traffic,
- products based on the use of raw materials from recycled materials, to reduce impact on the environment deriving from the extraction of virgin materials,
- lightweight products.

TROPIC SMOOTHING COMPOUNDS

VEL OF VOLATILE ORGANIC COMPOUNDS



THIXOTROPIC SMOOTHING COMPOUNDS

SINCE 2008 ALL THE MAPEI PRODUCTS FOR LEVELLING SUBSTRATES ARE CE MARKED AND CLASSIFIED ACCORDING TO THE EUROPEAN CLASSIFICATION FOR PRE-BLENDED MORTARS FOR SCREEDS EN 13813

The new European Standard for pre-blended mortars for screeds (EN 13813 “Screed material and floor screeds - Screed material - Properties and requirements”), has now become effective. This norm allows to classify the pre-blended mortars on the basis of the nature of the binders employed and on their physical and elasto-mechanical characteristics. This norm has been extended to leveling compounds as well.

In particular, the standard symbols illustrated here below have been adopted for TOPCEM PRONTO and MAPECEM PRONTO pre-blended mortars for screeds and the levelling compounds of MAPEI range, to indicate the following:



- Screeds made using **TOPCEM PRONTO**, in accordance with the indications contained in the Technical Data Sheet, are class CT (cementitious binder-based), C30 (compressive strength after 28 days equal to at least 30 N/mm²), F6 (flexural strength after 28 days equal to at least 6 N/mm²), A1_n (reaction to fire class).



- Screeds made using **MAPECEM PRONTO**, in accordance with the indications contained in the Technical Data Sheet, are class CT (cementitious binder-based), C60 (compressive strength after 28 days equal to at least 60 N/mm²), F10 (flexural strength after 28 days equal to at least 10 N/mm²), A1_n (reaction to fire class).

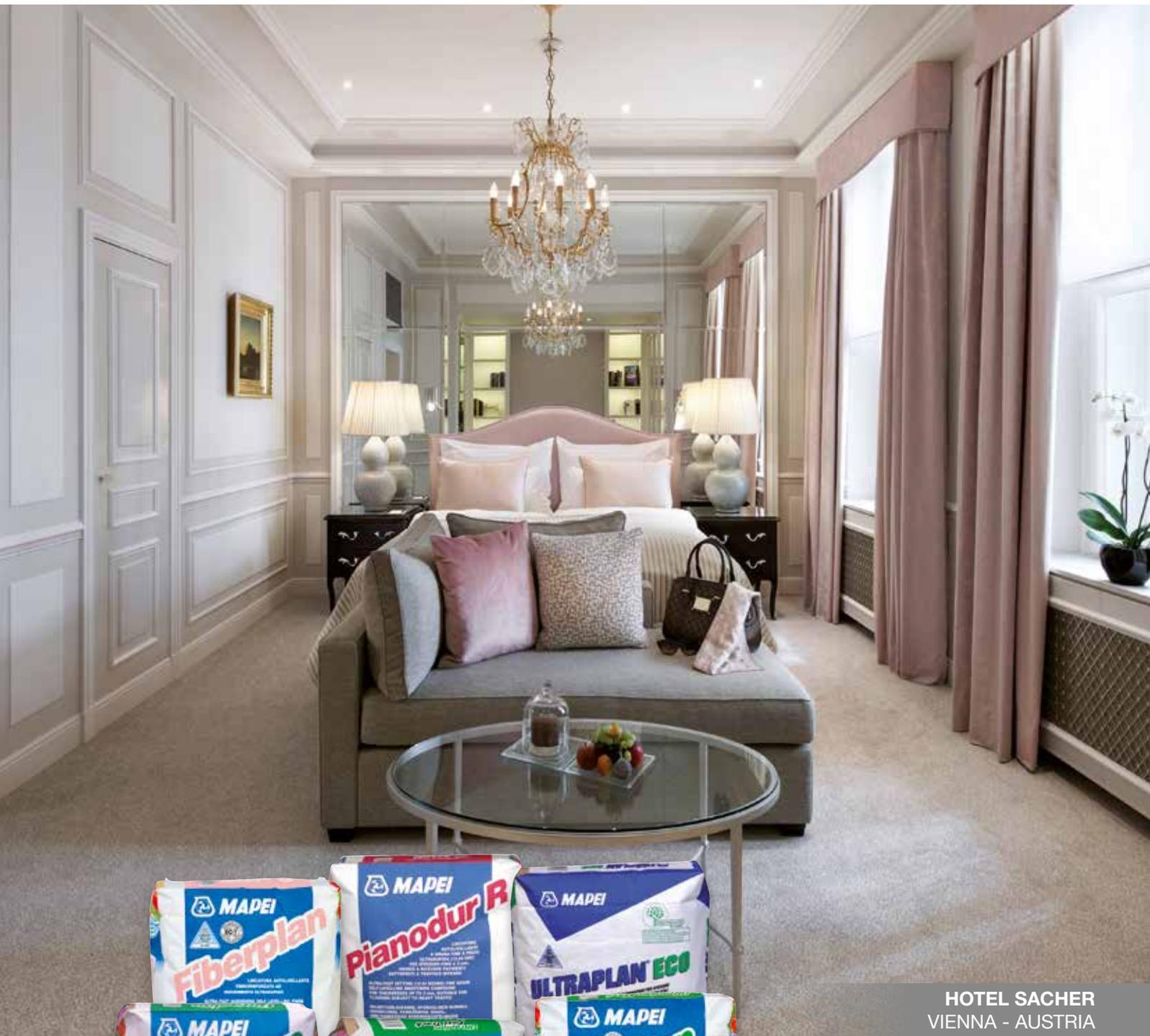


- Levelling compounds made using **ULTRAPLAN**, in accordance with the indications contained in the Technical Data Sheet, are class CT (cementitious binder-based), C30 (compressive strength after 28 days equal to at least 30 N/mm²), F7 (flexural strength after 28 days equal to at least 7 N/mm²), A2_n-S1 (reaction to fire class).

As with adhesives used for ceramic tiles and other product categories, according to the European Directive 89/106 for products used in construction work, it is also obligatory to apply the CE mark on the packaging of pre-blended mortars for screeds in order to favour free trade within the member States of the European Community. The CE mark on the packaging is a guarantee for the user that the manufacturer has respected the following directives:

- the screed and the levelling compound, if made according to the indications contained in the Technical Data Sheet, possess the mechanical characteristics and belong to the reaction to fire class indicated by the CE mark;
- the manufacturer has issued a signed Declaration of Compliance (EC Declaration) certificate, with which they assume all responsibility regarding declaration of the CE mark;
- with reference to the “Directive 89/106”, during production, the manufacturer is obliged to carry out controls guaranteeing the declared characteristics of the product.

SELF-LEVELLING SMOOTHING COMPOUNDS



HOTEL SACHER
VIENNA - AUSTRIA



SELF-LEVELLING SMOOTHING COMPOUNDS



Fiberplan



- ▶ Fibre-reinforced fast hardening self-levelling smoothing compound for thicknesses from 3 to 10 mm. Specially suitable for wood.



Pianodur R



- ▶ Fast setting fine grained self-levelling smoothing compound for thicknesses up to 3 mm, particularly suitable for skimming up to a feather-edge.



Ultraplan



- ▶ High strength, fast hardening self-levelling smoothing compound for thicknesses from 1 to 10 mm. It can be applied with an automatic pressure pump.



Ultraplan Eco



- ▶ Fast hardening self-levelling smoothing compound for thicknesses from 1 to 10 mm. It can be applied with an automatic pressure pump.



Ultraplan Fast Track



- ▶ Very high strength, ultra-fast drying self-levelling compound for thicknesses from 1 to 10 mm. It is suitable for restoring resilient floor which have to be ready for use in quick times.



Ultraplan Maxi



- ▶ High strength, ultra-fast hardening self-levelling smoothing compound for thicknesses from 3 to 30 mm. It can be applied with an automatic pressure pump.

SELF-LEVELLING SMOOTHING COMPOUNDS SELECTION CHART

THICKNESSES				SUBSTRATES					
0 - 3 mm	1 - 10 mm	3 - 10 mm	3 - 30 mm	Cementitious screeds	Anhydrite screeds	Heated screeds	Concrete	Ceramics, stone material, terrazzo, flagstones	Bonded parquet, chipboard, marine plywood

SELF-LEVELLING SMOOTHING COMPOUNDS										
Fiberplan 			●		● (1)	● (2)	● (3)	● (1)	● (4)	● (5)
Pianodur R 	●				● (1)	● (2)	● (3)	● (1)	● (4)	
Ultraplan 		●			● (1)	● (2)	● (3)	● (1)	● (4)	
Ultraplan Eco 		●			● (1)	● (2)	● (3)	● (1)	● (4)	
Ultraplan Fast Track 		●			● (1)	● (2)	● (3)	● (1)	● (4)	
Ultraplan Maxi 				●	● (1)	● (2)	● (3)	● (1)	● (4)	

1 - we recommend applying a coat of **Primer G**, **Eco Prim T** diluted at a ratio of 1:1-1:3 with water beforehand

2 - may only be used after applying **Primer G**, **Eco Prim T**, **Mapeprim SP**

3 - only after running the heating system (EN 1264-4)

4 - we recommend applying a coat of **Eco Prim T**, **Eco Prim Grip**, **Mapeprim SP** beforehand

5 - may only be used after applying **Eco Prim T**, **Mapeprim SP** or bonding slurry made from **Nivorapid + Latex Plus** or **Planipatch + Latex Plus**

6 - may only be used after applying **Eco Prim T**

	EN 13813 CLASSIFICATION	WAITING TIME	
		Set to light foot traffic	Sanding / Installation of resilients
● ⁽⁶⁾	CT C25 F7 A2 _{II} -s1	3 h	12 h
● ⁽⁶⁾		3 h	12 h
● ⁽⁶⁾	CT C30 F7 A2 _{II} -s1	3 h	12 h
● ⁽⁶⁾	CT C25 F7 A2 _{II} -s1	3 h	12 h
● ⁽⁶⁾	CT C40 F7 A2 _{II} -s1	1 h	2 h
● ⁽⁶⁾	CT C35 F7 A2 _{II} -s1	3 h	24-72 h

Screeds, skimming compounds and floorings with residues of old bonding materials

THIXOTROPIC SMOOTHING COMPOUNDS



EDUCATIONAL INSTITUTE
CERNUSCO SUL NAVIGLIO
(MILAN) - ITALY



THIXOTROPIC SMOOTHING COMPOUNDS



Nivorapid



- ▶ Ultra-fast setting thixotropic cementitious levelling mortar for horizontal or vertical surfaces for thicknesses from 1 to 20 mm, with very low emission of volatile organic compounds (VOC).



Nivorapid + Latex Plus

- ▶ Ultra-fast setting thixotropic cementitious levelling mortar for horizontal or vertical surfaces for thicknesses from 1 to 20 mm, with very low emission of volatile organic compounds (VOC).

- ▶ Admixture to be mixed with **Nivorapid** to improve the deformability and adhesion onto difficult surfaces.



Pianocem M + Livigum

- ▶ Thixotropic cementitious levelling compound for horizontal and vertical surfaces from 1 to 5 mm.



- ▶ Admixture for cementitious smoothing compounds and cementitious mortars.



Planipatch



- ▶ Smoothing, ultra-fast setting thixotropic cementitious levelling mortar for horizontal or vertical surfaces (thickness from 0 to 10 mm), with very low emission of volatile organic compounds (VOC).



Planipatch + Latex Plus

- ▶ Smoothing, ultra-fast setting thixotropic cementitious levelling mortar for horizontal or vertical surfaces (thickness from 0 to 10 mm), with very low emission of volatile organic compounds (VOC).



- ▶ Admixture to be mixed with **Planipatch** to improve the deformability and adhesion onto difficult surfaces.



Planiprep Fast Track



- ▶ Ultra rapid-drying fine textured thixotropic cementitious skimming compound, suitable for levelling and skimming new and existing internal substrates (from a feather-edge up to a maximum of 3 mm) to make them suitable for bonding all types of floor covering very quickly (2 hours), including resilients and textiles.



THIXOTROPIC SMOOTHING COMPOUNDS SELECTION CHART

	THICKNESSES				SUBSTRATES					
	0 - 3 mm	1 - 5 mm	0 - 10 mm	1 - 20 mm	Cementitious screeds	Anhydrite screeds	Heated screeds	Concrete	Ceramics, stone material, terrazzo, flagstones	Bonded parquet, chipboard, marine plywood
THIXOTROPIC SMOOTHING COMPOUNDS										
Nivorapid   				●	● ⁽¹⁾	● ⁽²⁾	● ⁽³⁾	● ⁽¹⁾	● ⁽⁴⁾	
Nivorapid + Latex Plus				●	●	● ⁽²⁾	● ⁽³⁾	●	●	●
Pianocem M + Livigum		●			● ⁽¹⁾			● ⁽¹⁾	● ⁽⁴⁾	
Planipatch   			●		● ⁽¹⁾	● ⁽²⁾	● ⁽³⁾	● ⁽¹⁾	● ⁽⁴⁾	
Planipatch + Latex Plus			●		●	● ⁽²⁾	● ⁽³⁾	●	●	●
Planiprep Fast Track 	●				●	● ⁽²⁾	● ⁽³⁾	●	●	

1 - may only be used after applying one coat of **Primer G** or **Eco Prim T**, diluted at a ratio of 1:1-1:3 with water beforehand

2 - may only be used after applying **Primer G** or **Eco Prim T**

3 - only after running the heating system (EN 1264-4)

4 - may only be used after applying one coat of **Eco Prim T** or **Mapeprim SP**

5 - may only be used after applying **Eco Prim T**

6 - when the product is used for skimming feather-edge or as a patching compound for local repairing

7 - when the product is used for levelling and smoothing large areas in thickness from 3 to 10 mm

RATES						EN 13813 CLASSIFICATION	WAITING TIME	
Metallic and resin surfaces	Well-bonded resilient floorings	Screeds, skimming compounds and floorings with residues of old bonding materials	Natural finish render	Lime-based render	Plasterboard		Set to light foot traffic	Sanding / Installation of resilientis
		● ⁽⁵⁾	● ⁽²⁾	● ⁽²⁾	●	CT C40 F10 A2 _{fl} -s1	2 h	60 min ⁽³⁾ 4 to 6 h ⁽⁴⁾
●	●	●	●	● ⁽²⁾	●		2 h	60 min ⁽³⁾ 4 to 6 h ⁽⁴⁾
			●	● ⁽²⁾	●	CT C25 F7 A2 _{fl}	4-24 h	24-72 h
		● ⁽⁵⁾	● ⁽²⁾	● ⁽²⁾	●	CT C35 F7 A1 _{fl} -s1	2 h	60 min ⁽³⁾ 4 to 6 h ⁽⁴⁾
●	●	●	●	● ⁽²⁾	●		2 h	60 min ⁽³⁾ 4 to 6 h ⁽⁴⁾
	●	●	●	● ⁽²⁾	●		1 h	2 h

MAPEI's research at the forefront



MAPEI's Research and Development laboratories are also at the forefront in the research into self-levelling and thixotropic smoothing compounds, using the most innovative testing and analytical methods. In particular, the application of new experimental techniques allows MAPEI to optimise the characteristics of their own self-levelling compounds according to requirements, which are dimensionally stable, with high self-levelling capacities, high mechanical strength and excellent workability.

FLOW TEST

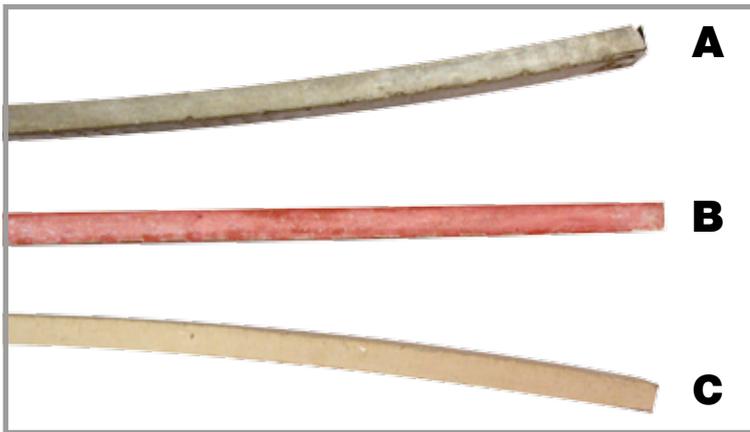
The characteristics of smoothing compounds are tested using rheology tests, such as the Flow Test: the fresh mix is poured into a cylinder which is closed at the bottom by a sliding plate. The sliding plate is then removed so that the product may flow onto a sheet of glass positioned below the cylinder. The product forms a circle, the diameter of which is then correlated to the self-levelling capacity of the product. The minimum expansion value for MAPEI self-levelling smoothing compound, measured within 20 minutes, is equal to 13-14 cm, according to the type of product.

SHRINKAGE AND EXPANSION

The reaction of cement to hydration provokes variations in volume of the smoothing compound. These reactions are transformed into movement which, through correct formulation, must be contained in order to avoid unwanted phenomena on site, such as cracking or detachment. MAPEI's Research laboratories have always been highly involved in these problems, and have developed a method which allows movement (shrinkage and expansion) developed by cementitious products to be quantified. The freshly-mixed product is poured into a silicone mould with a layer of metallic mesh, embedded on the bottom. Once the product has hardened, it is extracted from the mould and the curve it forms is measured. The same measurement is then carried out later.

The type of curve allows the behaviour of the product to be determined:

- A** - The centre of the sample is lower compared with the edges: shrinkage has taken place
- B** - The sample is not curved: the product is stable over time
- C** - The centre of the sample is higher compared with the edges: expansion has taken place



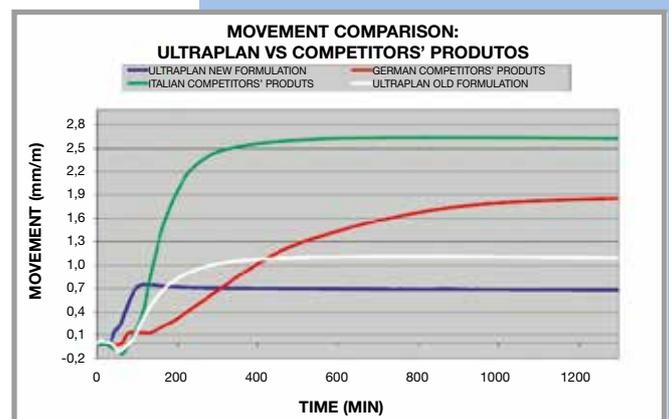
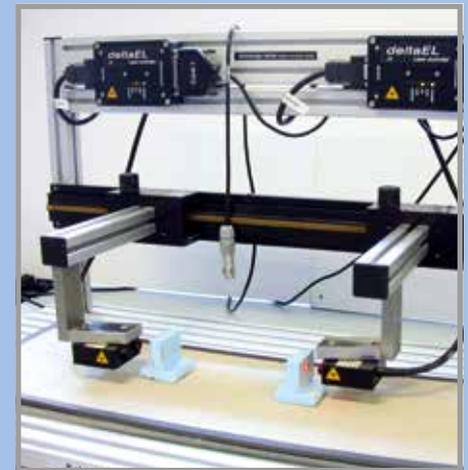
However, the method described above only allows dimensional variations of the samples to be measured after hardening, and does not allow the behaviour of the product during the plastic phase to be monitored. It is during this phase that the product is subject to higher transformation of its mechanical properties, passing from a fluid state to a solid state.

This phase is particularly critical and important, and in order to take place under controlled conditions, and to guarantee absolute stability during laying, the chemical composition of the self-levelling product must allow for expansion to take place which, at least partially, eliminates movement due to shrinkage.

To monitor the movements during the plastic phase, MAPEI Research laboratories use what is known as the "Thin Film" method.

The sample is poured onto a polyethylene film on a rigid support base contained by a rubber frame, which may be deformed so as not to impede movement. It varies in height in order to simulate various application thicknesses. Two cubes of polystyrene are then placed on the sample, which float on the surface.

These cubes reflect laser beams and measure their return time, the variation in which is an index of expansion and shrinkage of the product. For example, the diagram illustrates the curve recorded by the movement sensor during the plastic phase of ULTRAPLAN (new and old composition) and two products produced by rival manufacturers.





MECHANICAL STRENGTH

To measure the mechanical characteristics required for various smoothing compounds, compressive and flexural strength, tests are carried out on samples at various curing stages.

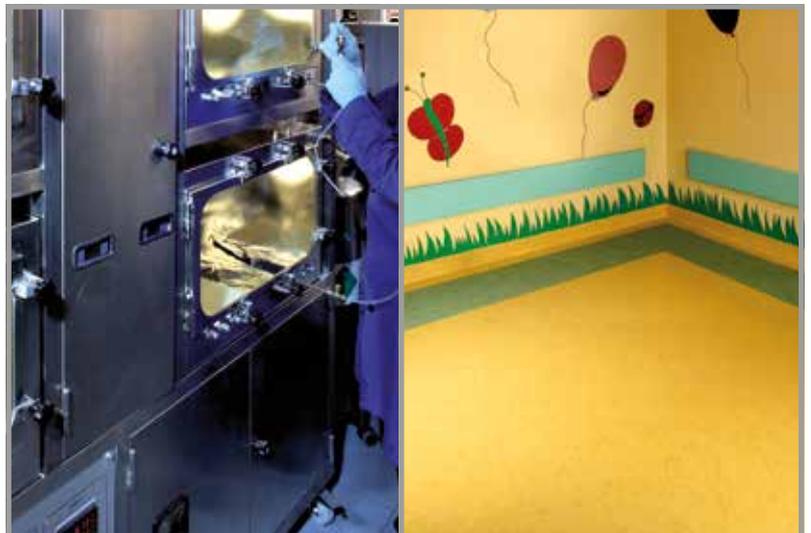
ABRASION RESISTANCE

Abrasion resistance for all smoothing compounds is measured on 4 mm thick samples at 7 and 28 day intervals. The parameter measured is loss in weight of the sample: the lower the loss, the better the abrasion resistance.



VOC MEASUREMENTS

One of the main driving forces behind MAPEI research is the target of developing products which are less and less hazardous for those who use them, and which also have a lower impact on the environment. An environmental simulation chamber has been developed, initially by the research centre in Laval in Canada, followed by the research centre in Milan. This is a special piece of equipment which is able to measure the emissions of volatile organic compounds (VOC), even at very low levels. Thanks to this technology, MAPEI laboratories have developed a complete range of products, including ULTRAPLAN ECO self-levelling compound. It is characterised by an extremely low level of volatile organic compounds (VOC) which, since October 2005, has been certified and identified as EMICODE-EC1 by GEV (Gemeinschaft Emissionskontrollierter Verlegewerkstoffe, Klebstoffe und Bauprodukte e.V.), an association for the control of emissions from products for floors.





ANALYTICAL METHODS

The capacity to analyse raw materials and to identify their potential is fundamental for the technological development of new products, and to optimise existing ones. With this aim in mind, MAPEI laboratories use the most advanced instruments and techniques to carry out chemical and chemical-physical analysis, such as X-ray diffractometers, spectrophotometers, all types of chromatography and an ESEM-FEG microscope. There are also several other analytical techniques, which are capable of assessing each single characteristic of the various products, including self-levelling compounds.





● **Technical documentation**

From the technical area menu you can view the technical documentation divided per product lines and type of document.

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