Mapefloor™ CPU
Cement-based Flooring Systems

Installation Manual

MAPEI®

The information contained herein and any other advice, are given in good faith based on MAPEI's current knowledge and experience, and are adequate when the products are properly stored, handled and applied under normal conditions, in accordance with MAPEI's recommendations. The information only applies to the applications and products expressly referred to herein, and are based on laboratory tests which do not replace practical tests and may not fully reflect actual performance on site where application and service conditions will be different. In case of changes in the parameters of the application, such as differences in substrates, temperature and ambient moisture, etc., or in case of different service conditions, consult your local MAPEI Technical Assistance prior to using the products. The information contained herein does not relieve the user of the products from testing them for the intended application and purpose. The specialist contractor is responsible for strictly following the application recommendations contained in the available documentation.

Users must always refer to the most recent local Technical Data Sheet (TDS) for the product concerned, which can be obtained from the website (**www.mapei.ca**) or local MAPEI representative.

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1.1 General information

The *Mapefloor™ CPU* product range is a set of polyurethane/cement-based products designed to provide the optimal solution for the most severe and demanding flooring environments. They are multi-component products consisting of two liquid products, a polyol, and an isocyanate, and a powder component with varying grades of aggregates and cement to provide the different characteristics of the products. To these, a powder pigment is added to the various surface screed mortars or a liquid paste for the detailing mortar or the topcoat sealer.

The various components of the *Mapefloor CPU* product range are listed below:

Mapefloor CPU/HD [NA] is a heavy-duty polyurethane/cement-based screed, designed to provide excellent resistance to thermal stress, abrasion, impact, and chemical attacks, for coating industrial floors in layers from 6 to 9 mm (1/4" to 3/8") thickness.

Mapefloor CPU/HD is suitable for concrete and cementitious substrates, even when lightly damp.

Mapefloor CPU/HD is characterized by a textured surface providing it a good slip-resistant profile; it is watertight, anti-dust and wear resistant.

Mapefloor CPU/RT [NA] is a heavy-duty polyurethane/cement-based screed, very easy to apply, designed to provide excellent resistance to thermal stress, abrasion, impact, and chemical attacks for coating industrial floors in layers from 6 to 9 mm (1/4" to 3/8") thickness.

Mapefloor CPU/RT is suitable for concrete and cementitious substrate, even lightly damp.

Mapefloor CPU/RT is characterized by a textured surface providing it a good slip-resistant profile; it's watertight, anti-dust and wear resistant.

Mapefloor CPU/MF [NA] is a medium- to heavy-duty, self-leveling, polyurethane/cement-based screed for coating industrial floors in layers from 3 to 6 mm (1/8" to 1/4") thickness, designed to provide excellent resistance to thermal stress, abrasion, impact, and chemical attack.

Mapefloor CPU/MF is suitable for concrete and cementitious substrates, even lightly damp.

Mapefloor CPU/MF is characterized by a flat surface providing good slip-resistance; it's watertight, anti-dust and wear resistant.

Mapefloor CPU/SBF is a medium-heavy duty polyurethane-cement self-levelling screed, with enhanced flowability especially formulated for coating industrial floors as a broadcast screed in layers from 4.5 to 6 mm (3/16" to 1/4") thickness, designed to provide excellent resistance to thermal stress, abrasion, impact, and chemical attack.

Mapefloor CPU/SBF is suitable for concrete and cementitious substrates, even lightly damp.

The Mapefloor CPU/SBF system is characterized by a textured surface providing very good slip-resistance; it's watertight, anti-dust and wear resistant.

Mapefloor CPU/COVE [NA] is a heavy-duty polyurethane/cement-based screed for making covings and details. It is used to form fillets and covings between walls and floors or other features in industrial floors in combination with other products from the *Mapefloor CPU* product range.

Mapefloor CPU/COVE is suitable for use on concrete and cementitious substrates which must be dry.

Mapefloor CPU/COVE is characterized by its high strength and resistance to chemicals. It is easily trowelled and finished to a smooth yet slightly porous surface. To make it non-absorbent and easy to clean, it can be over coated with *Mapefloor CPU/TC* [NA].

Mapefloor CPU/TC [NA] is a polyurethane/cement-based formulate for coating walls and floors, and as a finishing coat on polyurethane/cementitious systems for industrial floors. It is used as a standalone protective coating, as a surface improvement or maintenance coat for smooth screeds or as a sealer or aggregate binder for broadcast systems in damp environments.

Mapefloor CPU/TC is suitable for concrete or cementitious substrates, even lightly damp, or mortars from the *Mapefloor CPU* product range.

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Mapefloor CPU/TC is characterized by its high fluidity and good hiding power, its high resistance to chemicals, such as acids, base solutions, oil, grease, saline solutions, hydrocarbons, etc.

1.2 Uses/destinations

Mapefloor CPU/HD is the right solution for floors subjected to high loads and/or forklift traffic, high chemical and mechanical stresses, impacts, thermal shocks, steam cleaning, in which the surface could be wet, so an anti-slip characteristic is required. For example, it can be used in dairies, food and beverage industries, pharmaceutical and chemical plants, freeze rooms, slaughterhouses, etc.

Mapefloor CPU/RT is the right solution for floors subjected to high loads and/or forklift traffic, high chemical and mechanical stresses, impacts, thermal shocks, steam cleaning, in which the surface could be wet, so an anti-slip characteristic is required. For example, it can be used in dairies, food and beverage industries, pharmaceutical and chemical plants, cooler rooms, slaughterhouses, etc.

Mapefloor CPU/MF is the right solution for floors subjected to medium-high loads and/or forklift traffic, high chemical and mechanical stresses, impacts, in dry or lightly wet processing areas, up to 70°C (158°F). For example, it can be used in food industries, pharmaceutical and chemical plants, etc., cold stores down to -10°C (+14°F).

Mapefloor CPU/SBF is the right solution for floors subjected to medium to heavy traffic, aggressive chemicals and mechanical stresses, impacts, thermal shock up to 80°C (176°F), in which the surface could be wet, so a textured anti-slip characteristic is required. It can be used in wineries, breweries, dairies, food and beverage industries, pharmaceutical and chemical plants, cold stores down to -20°C (-4°F), slaughterhouses, etc.

Mapefloor CPU/COVE is the right solution for detailing and coving, joint repair, fixing of drains and gullies on floors subjected to high loads and/or forklift traffic, high chemical and mechanical stresses, impacts, in dry or lightly wet processing areas. For example, it can be used in food and beverage industries, pharmaceutical and chemical plants, etc.

Mapefloor CPU/TC is the right solution for floors subjected to medium-high loads and/or forklift traffic, high chemical and mechanical stresses, impacts, in dry or lightly wet processing areas, when *Mapefloor CPU/TC* is applied as a finishing coat for *Mapefloor CPU* screeds. It will resist thermal shock and the same service temperatures as the screed if applied within 12 hours of the hardening of the base layer. As a standalone coating it is suitable for light-medium loads and moderate chemical and mechanical stress. For example, it can be used in food and beverage industries, pharmaceutical and chemical plants, etc.

All *Mapefloor CPU* products are generally used for indoor floors. When applied onto outdoor surfaces, like all urethane cement formulations, they will change color when exposed to UV light, but will keep almost all their properties. Color deviation must be accepted by end-user.

1.3 Products

Heavy duty screed:

- *Mapefloor CPU/HD* – multi-component (+ pigment *Mapecolor™ CPU* [NA]), water dispersed, polyurethane resin and cement mortar.
- *Mapefloor CPU/RT* – multi-component (+ pigment *Mapecolor CPU*), water dispersed, polyurethane resin and cement mortar.

Medium-heavy duty self-leveling screed:

- *Mapefloor CPU/MF* – multi-component (+ pigment *Mapecolor CPU*), water dispersed, polyurethane resin and cement mortar.

Medium-heavy duty broadcast system:

- *Mapefloor CPU/SBF* or *Mapefloor CPU/MF* –multi-component (+ pigment *Mapecolor CPU*), water dispersed, polyurethane resin and cement mortar.

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- QUARTZ #24 mesh or QUARTZ #32 mesh broadcast aggregate.
- *Mapefloor CPU/TC* – multi-component (+ *Mapecolor Paste* [NA] pigment), water dispersed, polyurethane resin and cement coating.

Coving and detailing mortar:

- *Mapefloor CPU/COVE* - multi-component (+ pigment *Mapecolor Paste*), water dispersed, polyurethane resin and cement mortar.

Sealer and top coat:

- *Mapefloor CPU/TC* – multi-component (+ *Mapecolor Paste* pigment), water dispersed, polyurethane resin and cement coating.

Standard colors of *Mapecolor CPU*: grey – red – green – ochre - beige -blue

There could be some discoloration or color variation if *Mapefloor CPU* is in contact with chemicals. The discoloration does not necessarily mean that the mechanical properties are adversely affected. The end-user must accept the color variation.

A change in color, however, does not necessarily mean that it has been damaged or softened by the chemical. The change in color is an intrinsic characteristic of the floor technology.

Typical color deviation due to concentrated sulphuric acid attack.

Section 2: Preliminary Floor Analysis

All following general issues are valid for any kind of flooring system.

2.1 Substrate evalutaion

Before any operation, the substrate must be carefully examined and checked. Visual and instrumental inspections must be carried out to verify the concrete and surface quality and condition. The visual examination must verify the surface condition for the presence of cracks, concrete failures, roughness, areas made in different periods or with different materials, static and dynamic joints, general levels, slopes, presence of oils or contaminants, presence of old coatings, porosity, etc.

Check for the presence of cracks, damaged areas, slope and flatness, concrete slabs made in different time, etc.

When examining a tiled surface, it's important to check if tiles are well bonded to the substrate. To do that, it is possible to make a small steel ball roll on the tiles' surface. The sound the ball makes when rolling on loose tiles is totally different from the sound it makes on a monolithic substrate.

Instrumental examination must check concrete resistances and conditions. Here are descriptions of the most important tests to be done.

2.2 Concrete and cementitious substrates

The *Mapefloor CPU* system build-ups can be laid over concrete and cementitious substrates in our *Mapecem*® range of products.

2.2.1 Concrete test hammer

Concrete test hammer gives an idea of concrete compressive strength. In general it works well on young concrete, but even on old substrates, it's able to provide an idea of whether the concrete has good resistance or not. This test is not destructive, and very easy and fast to do.

The minimum compressive strength required is 25 MPa (>3,600 psi).

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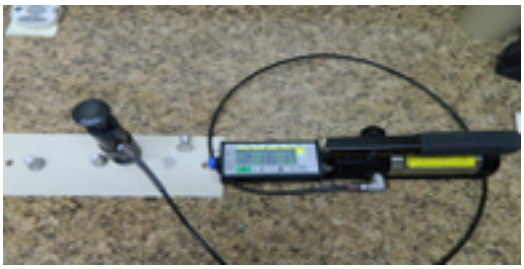
2.2.2 Pull-off test

Pull-off test measures the concrete cohesion strength. It must be done when concrete test hammer gives low strength values, close to the minimum value required, or when there is some doubt of having adequate concrete strength.



The minimum pull-off strength required is 1.5 MPa (>217 psi)

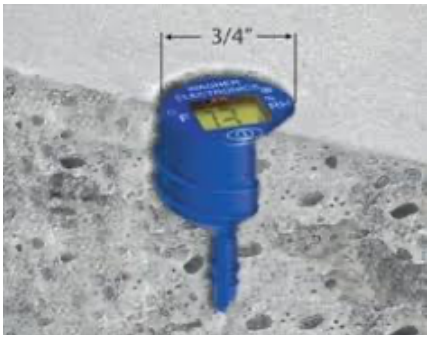
2.2.3 Concrete moisture and rising damp

Due to its chemistry, the *Mapefloor CPU* range is tolerant to the presence of moisture and rising dampness in the substrate. The surface could be damp, but there must be not free water, puddles, etc.

In any case, avoid condensation on the resin surface during setting time to avoid discoloration or similar aesthetic defects.

The substrate moisture content (% by weight) could be checked using a non destructive electronic moisture-meter.

Destructive testing could be done, but take note that a calcium-carbide test could measure different moisture content than an electronic moisture-meter, due to the kind of chemical reaction involved in that test.



Moisture Probe Test

Calcium Chloride Test Kit

Analog Moisture Meter

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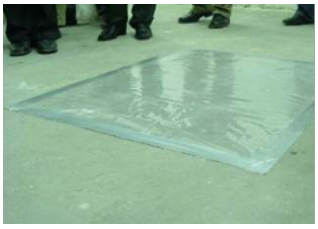
2.2.4 Rising damp

Rising damp cannot be checked with a moisture-meter. It must be checked with the polyethylene sheet test according to ASTM D4263. This test is done by positioning a polyethylene sheet of at least one square meter (10.8 sq. ft.) onto the floor surface, sealing its edges with adhesive tape.

After 24 hours, check for the presence of condensation on the underside of the sheet; or if the concrete surface beneath it is darkened. In both cases, the concrete probably contains too much water or there is rising damp.



This test doesn't work well in cold conditions because the concrete could retain its humidity. In that case it could be possible and useful to heat the test area using infrared lamps or direct sunlight, but those conditions couldn't be the same to which the coating will be exposed once applied. For this reason those test results may be misleading.

Mapefloor CPU can be applied onto mechanically prepared damp substrates without any liquid water present, commonly referred to as SSD or saturated surface-dry.

2.2.5 Roughness and porosity

Surface roughness influences the material consumption. A rough surface also guarantees proper adhesion strength, but when excessive, it makes it difficult to have a totally pore-free base coat. Also concrete porosity can badly affect the full filling of surface pores by the base coat.

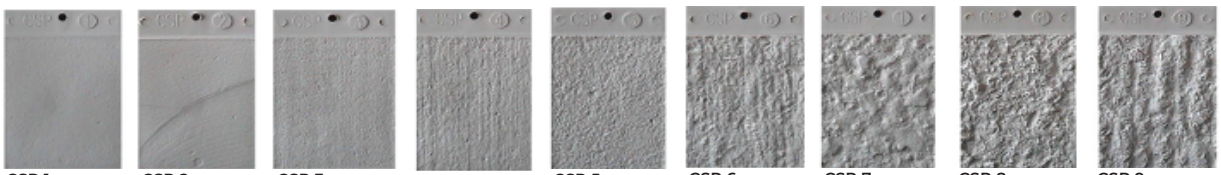
The roughness can be increased by mechanical surface treatment, especially through scarification.

As a general and smart rule, the roughness should not exceed 1/3 of the designed coating thickness.

A method for determining the substrate roughness is to compare with the reference plates by the International Concrete Repair Institute (ICRI) in their Technical Guideline 310.2R "Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair" which defines 10 different degrees of Concrete Surface Profiles or CSPs, depending on the method used and the thickness of the coating to be applied.

Concerning the porosity of the substrate, it will have an impact on the consumption of the primer layer applied and how well the whole system bonds to the substrate.

The more porous the substrate, the higher the material consumption will be, and the better the bond, provided sufficient material is applied to ensure an adequate build-up structure. Consequently, it will affect the type of substrate preparation to perform.



CSP 1 Acid Etching
CSP 2 Grinding
CSP 3 Light Shotblasting
CSP 4 Medium Shotblasting
CSP 5 Medium-Heavy Shotblasting
CSP 6 Heavy Shotblasting
CSP 7 Heavy Shotblasting
CSP 8 Extreme Shotblasting
CSP 9 Extreme Shotblasting

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2.2.6 Surface pollution

Contaminants are very dangerous for a good bonding of any coating system to the substrate and for the absence of fish-eyes or equivalent aesthetic defects. Contaminants could be oils or grease; in this case wash the surface very well with adequate detergents and cleaning machines, then let the substrate dry and check if there is more rising oil leaching up to the surface; in that case repeat the washing operation.

Once clean, the surface must be shotblasted. In some cases it is impossible to obtain a clean substrate because the surface is almost saturated by oils. In this situation it is advisable to wash the surface as best as possible and scarify it to remove contaminated substrate. Do not use solvents, because they dilute the oils making them penetrate deeper into the concrete.

Typical example of damaged and oil-impregnated surface.

When contaminants are blood, animal fats, milk, or organic compounds from food stuff, there is also the risk to have bacterial growth at the bonding line that can badly affect the adhesion of the coating to the substrate. In this case pay more attention to cleaning with appropriate detergents, followed by mechanical removal.

Do not forget: in any case, a strong mechanical preparation (e.g.: strong shotblasting or scarifying) is always necessary!

It is almost impossible to be absolutely sure that every contaminant has been removed. It is always recommended to do a test on-site to confirm the method of preparation and check the final result.

Flames can cause spalling and can otherwise damage the concrete (hazardous fumes or a full blown fire may also result), and therefore should not be used.

2.3 Non-cementitious substrates

2.3.1 Tiles

As a general rule, all tiled substrates must be removed prior to the application of *Mapefloor CPU* flooring systems.

Refurbishment of tiled floors is generally undertaken because of failures of the joints, loose tiles, contaminated substrate, etc. Such conditions do not provide a sound substrate for the *Mapefloor CPU* screeds, which will eventually lead to the failure of the refurbished floor.

In the exceptional case that a tiled floor is to be refurbished with a jointless *Mapefloor CPU* screed, the tiled substrates must be strong, sound, and solid. Tiles must have good adhesion onto their substrate; the minimum pull-off strength value of 1.5 N/mm^2 is always valid. Loose tiles must be removed, and the area repaired with cementitious or resin mortars. It's impossible to be sure that all the tiles have good adhesion to the substrate or that all non-adherent tiles have been removed. So the best solution is to remove all tiles, if possible.

A fast check could be done using a small steel ball, a hammer, or an iron bar. The ball is rolled on the tile surface, or the hammer or the bar are dragged on the floor. Listening to the sound they produce, it is possible to identify any non-adherent tiles.

Tile joints' grout could be very damaged, so there is the risk that contaminants have been penetrated through them to the bedding mortar. This fact must be taken into consideration when over-coating tiles.

2.3.2 Natural stones

Natural stones must be treated and considered as ceramic tiles mentioned above and should be removed. Natural stones are generally used in public and civic buildings; therefore there shouldn't be any risks of surface contamination.

Contact MAPEI's Technical Services department for stone recommendation.

2.3.3 Asphalt

All asphalt surfaces should be removed prior to the application of the *Mapefloor CPU* product range.

The application on asphalt is problematic because it is not possible to guarantee the best adhesion on it of any resin system. Asphalt could be very porous or not, and it softens as temperature rises. The application of a rigid system on asphalt, (as with *Mapefloor CPU/HD*, *Mapefloor CPU/RT*, *Mapefloor CPU/MF* or *Mapefloor CPU/SBF*, and *Mapefloor CPU/TC*) must be avoided.

In some cases, after a strong shotblasting treatment, some polyurethane systems could be applied, but a test on site to confirm the compatibility with the substrate and with the intended use is mandatory.

2.3.4 Old resin coatings

An existing resin coating could be a perfect substrate for a new resin application. The old one must be perfectly bonded onto the substrate and have the minimum mechanical resistance required for a concrete slab. Damaged areas must be removed and repaired.

Existing resin-coated substrates which require refurbishing should be carefully evaluated in every case.

Problem areas will generally be:

- existing cracks in the floor which must be evaluated for movement.
- de-bonded or worn out coatings.
- blistered coatings.

In general, if the substrate is sound and any cracks and damaged areas are repaired, mechanical treatment of the surface by grinding of self-leveling resin screeds, or preferably shotblasting for thin resin screeds, will achieve removal of dirt and contamination, opening up the surface texture, according to the recommended surface profile for each type of *Mapefloor CPU* product (e.g.: with diamond grinding, shotblasting or scarifying).

After dust removal, the new resin can be applied directly onto the surface. Not all the resins are compatible with each other. It is impossible to be sure beforehand whether the new resin will adhere to the old one; there is just a general rule described below:

NEW RESIN	OLD RESIN	VIABLE
epoxy	epoxy	Yes
epoxy	polyurethane	Not recommended
polyurethane	polyurethane	Yes
polyurethane	epoxy with broadcast	Yes
polyurethane-cement	epoxy	Yes with primer
polyurethane-cement	polyurethane	Yes with primer

Don't forget, this is not a universal rule! So a test on site to confirm the compatibility is advisable.

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2.3.5 **Other types of substrate**

Even rarely, it is possible to find other kinds of substrate like vinyl or linoleum or rubber sheets, textiles, timber floor, steel floor, cement-asphalt screed, etc.

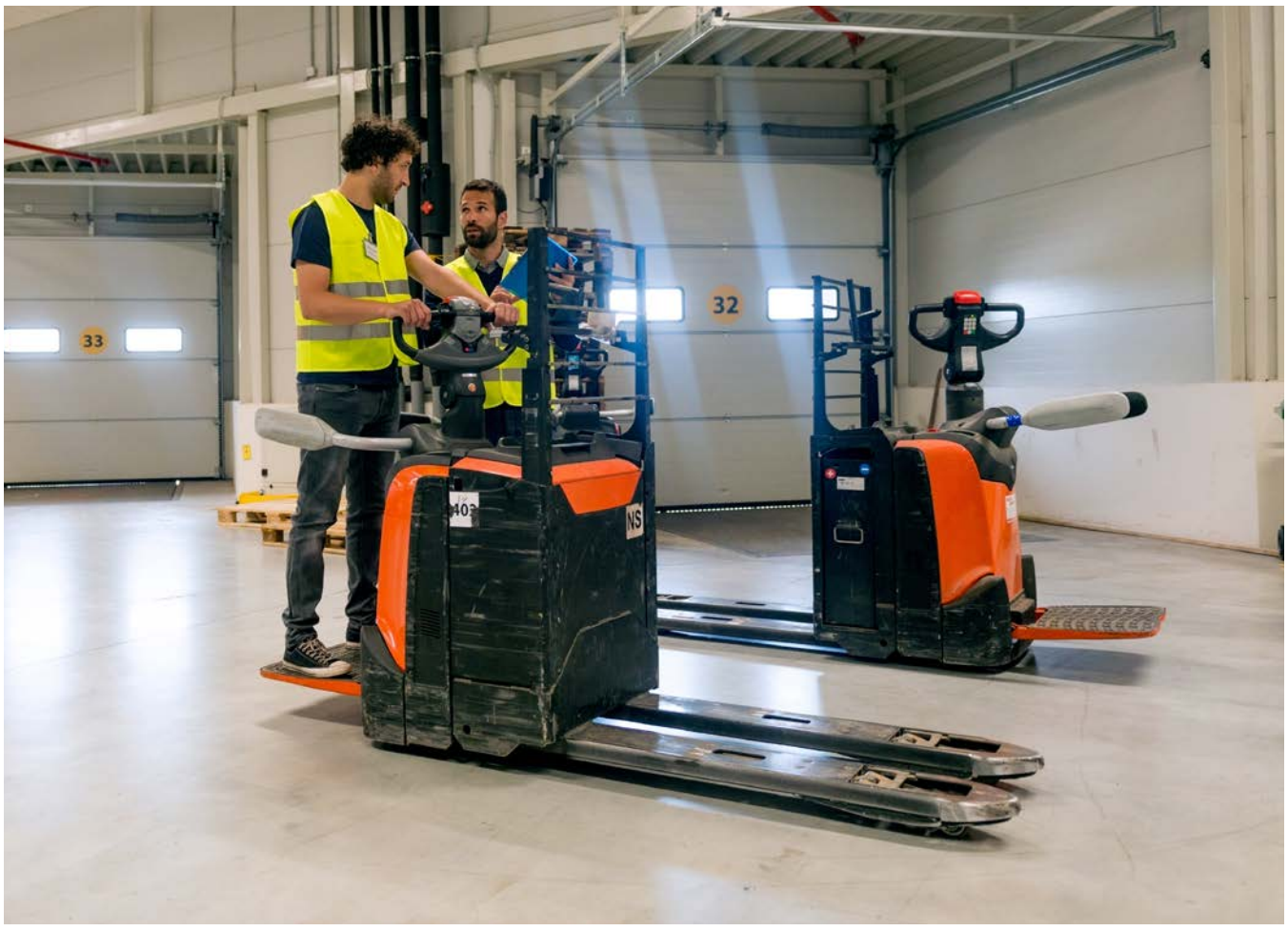
All resilient and textile coatings and their adhesives must be totally removed. Wood guarantees a very good adhesion, but it is a flexible and hygroscopic substrate with high potential movements. All the other kinds of possible substrates must be evaluated on a case-by-case basis.

2.4 Job-site logistics

Check for the presence of electrical power near the application areas. The power must be sufficient for surface preparation machinery, vacuum cleaners, mixing equipment, artificial lighting, possible heating system, etc. If not, a portable generator must be used. You need the power! Never mix the resins by hand! In some cases, when water-based products are used, the water supply is necessary.

All the resin must be stored in a covered and protected area, in cool and dry conditions. The best situation is when the temperature is between 15°C (59°F) and 25°C (77°F), and relative humidity is at <85%. Allow the material to acclimatize to the ambient temperature for at least 24 hours.

Verify the accessibility to the job-site and to application area: the availability of a fork lift for unloading the pallets, a recovery area for disposable materials such as empty tins, general garbage, waste products of the surface preparation, etc.



Section 3: Preliminary Operations

3.1 Surface treatment

Mapefloor CPU/HD and *Mapefloor CPU/RT* are thickness screeds, at least 6 to 9 mm (1/4" to 3/8"). They are suitable for damaged surfaces, when the mechanical treatment that must be used to remove contaminants may result in a very rough surface.

The best way to prepare the floor surface for the application of *Mapefloor CPU/HD* or *Mapefloor CPU/RT* is either shotblasting or scarifying, to achieve a surface profile value of between CSP 6 and CSP 9 according to the ICRI.

Mapefloor CPU/MF is a medium-high thickness coating, at least 3 to 6 mm (1/8" to 1/4"). The best way to prepare the floor surface for the application of *Mapefloor CPU/MF* is by shotblasting treatment, to achieve a surface profile value of between CSP 4 and CSP 7 according to the ICRI.

Mapefloor CPU/SBF is a medium thickness screed, at least 4.5 to 6 mm (3/16" to 1/4"). It is suitable for damaged surfaces, when the mechanical treatment that must be used to remove contaminants may result in a very rough surface.

The best way to prepare the floor surface for the application of *Mapefloor CPU/SBF* is either shotblasting or scarifying, to achieve a surface profile value of between CSP 4 and CSP 7 according to the ICRI.

SYSTEM	MIN. CSP	MAX. CSP
Mapefloor CPU/HD	CSP 6	CSP 9
Mapefloor CPU/RT	CSP 6	CSP 9
Mapefloor CPU/MF	CSP 4	CSP 7
Mapefloor CPU/SBF	CSP 4	CSP 7
Mapefloor CPU/COVE	CSP 3	CSP 6
Mapefloor CPU/TC	CSP 2	CSP 3

To summarize, the table above provides the minimum and maximum recommended CSP profiles for the application of the various *Mapefloor CPU* products.

Concrete surface profiles according to ICRI 310.2R-2013		Application thickness D.F.T according to BS 8402 part6														
		Floor Seal	Floor Coating	High-build coating			Flow applied flooring	Heavy duty flowable flooring								
								Screed flooring								
						Multilayer coating					Heavy duty screed flooring					
		0 mm	0.15 mm	0.30 mm	0.60 mm	1 mm	2 mm	3 mm	4 mm	5 mm	6 mm	7 mm	8 mm	9 mm	10 mm	11 mm	12 mm
CSP 1	Acid etching															
CSP 2	Grinding															
CSP 3	Light shotblasting															
CSP 4	Medium shotblasting															
CSP 5	Medium-heavy shotblasting															
CSP 6	Heavy shotblasting															
CSP 7	Heavy shotblasting															
CSP 8	Extreme shotblasting	Can also be achieved by scabbing														
CSP 9	Extreme shotblasting	Can also be achieved by scabbing														

Section 3: Preliminary Operations

3.1.1 Diamond grinding

Diamond grinding does not provide sufficient surface texture for the application of *Mapefloor CPU* screeds, and should not be used, unless followed by intensive shotblasting or scabbing. Diamond grinding is only suitable to roughen up the surface to a CSP of 2, when used on existing *Mapefloor CPU* screeds which require a maintenance coat with *Mapefloor CPU/TC*, or on a concrete slab.

Diamond grinding must be done with appropriate machinery, using an abrasive diamond disc as shown in the picture here:

This treatment removes a thin layer of the floor surface and makes the surface clean, lightly absorbent and textured. It is the perfect solution for non-contaminated and non-damaged floor surfaces.

Diamond grinding is also suitable for ceramic tiles and stones. On tiles, the best way is to perform the preliminary operation by diamond grinding, which will prepare the whole surface, followed by shotblasting that will perfectly clean all tile joints and will roughen the surface.

Old solid and adherent resin coatings may be treated with a light diamond grinding, or with sandpaper discs. The diamond grinding should be used carefully because it can heat the resin surface, which may cause it some damage.

3.1.2 Shotblasting

Shotblasting has to be done with appropriate machinery using steel abrasive shot. The machinery is connected to a powerful vacuum cleaner that removes almost all dust during operations. Shotblasting power can be regulated by choosing the quantity of abrasive to be used and the feed speed of equipment. A low speed and a big quantity of abrasive make a very rough floor surface. Increase the speed or reduce the abrasive quantity to reduce roughness.

Shotblasting creates an open-textured surface profile, so it's the best method for a perfect adhesion of thin-medium layer coatings. But it can also create surface defects like holes, cracks, roughness, etc., that can increase the consumption of materials.

Shotblasting treatment on tiles and old concrete surfaces

Always ensure the floor surface is free from oil, grease, loose particles, contaminants, cement laitance, or any substance that can reduce the adhesion. Before the application of *Mapefloor CPU* screeds, remove all remaining steel abrasives and dust by vacuum cleaner.

Shotblasting creates an open-textured surface profile, so it is a very good method for a perfect adhesion. But it can also create surface defects like holes, cracks, roughness, etc., that must be repaired or leveled before the application of the next layer.

Shotblasting treatment made cracks deeper and wider and removed all loose and friable parts.

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3.1.3 Scarifying

The milling treatment consists of a series of hardened steel discs rotating freely along several axes, which in turn rotate horizontally around a main axis and are driven by a relatively heavy machine.

The scarifying treatment makes the surface very rough, so it is the best method for a very good adhesion of thick layer screeds. However, this treatment in some cases can create some surface problems due to the intense and continuous stress from chipping.

Before the application of heavy duty *Mapefloor CPU* screeds, remove all dust using a vacuum cleaner.

Retaining grooves must be created to prevent curling of the screed during hardening, and to distribute mechanical and thermal stresses. Use a double-blade saw connected to an industrial vacuum cleaner; they must be twice as wide and twice as deep as the mortar screed to be applied.

Retaining grooves must be created in the perimeter of the application area, near walls, columns, plinths, drain channels, basements, etc., or in any situation that is a discontinuity of the screed. They must also be created as day joint at the end of each application. The distance from the edge of the finished screed can be approx. 5 to 10 cm (2" to 4").

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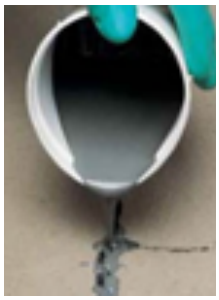
3.2 Cracks, holes, joints, surface defects

Weak concrete in limited areas must be totally removed, manually or mechanically. All cracks, holes and similar defects must be totally exposed. Use power hammers, power chisels, grinding machines, etc.

After that, small defects must be repaired with epoxy products, such as *Mapefloor EP 19* [NA] or *Mapefloor EP 20* [NA]. The *Mapefloor CPU* screed can also be used to repair holes and areas in which tiles have been removed, either lean or filled with coarse aggregate, (3 to 5 mm [1/8" to 1/5"]). The product must be well hardened before the application of the final screed.



Static joints may remain unfilled to be used as retaining grooves. Dynamic joints must be sealed to avoid the material flowing into them during the application. To do that, it is possible to use *Mapefloor I 900* [NA] or *Primer SN*™ [NA] mixed with *Additix*™ *PE* [NA] until a highly thixotropic consistency is reached, like putty. This solution is also suitable to fill cracks, pores, voids etc., but only if the substrate is sufficiently dry.

All dynamic joints, or those joints where movement is to be expected, must be respected and reflected on the surface once the *Mapefloor CPU* screed is applied and cured. The new joints will be created in the same position as existing ones. Old joint positions can be detected by inserting a nail during preliminary sealing with the epoxy grout mentioned above. Remove all weak and friable parts, and then repair with *Mapefloor CPU* screeds.

Inserting a nail in the old joint and marking its line on the wall is useful to trace the new line to saw to create the new joint.

In areas which are particularly weak, or surfaces where different materials are present (i.e. ceramic tiles and cementitious patches), the application of *Mapefloor I 900* or *Primer SN* reinforced with glass fiber mesh, followed by a full broadcast of quartz, is the best way to provide a suitable repair when it is necessary.

Filling cracks and joints is easy with *Mapefloor I 900* or *Primer SN* modified with *Additix PE*. The use of an embedded mesh is useful, but not always necessary. Do not use if thermal exposure is expected on the screed.

Section 3: Preliminary Operations

3.3 Mixing area

Choose an appropriate area for mixing operations. It must be close to the application area and power supply, so as to reduce cable length and the risk of stumbling accidents. To avoid soiling the area, it must be well protected with cardboards, polyethylene sheets or other protective coverings, all well fixed with adhesive tape to the floor surface.

The stock of *Mapefloor CPU* products to be used that day should be placed near the mixing area.

Allow enough space for accumulation and handling of the emptied canisters and bags.

If possible, it is convenient to place a dust extraction unit (a simple vacuum cleaner tube will suffice) near the mixing point to prevent dust from the addition of the powder components to contaminate the surrounding areas.

3.4 Ambient and surface conditions

Surface and air temperature, and air relative humidity must be checked. Be sure there is no possibility of condensation on the substrate or onto the uncured product once applied. Condensation can affect the setting time and aesthetic surface aspect. The substrate must be at least 2.8 degrees C (5 degrees F) above the dew point to reduce the risk of condensation. (See table below). The ambient and surface conditions should be checked at least 3 times per day: (morning, midday, afternoon).

E.g.: air temperature is approx. 24°C (75°F) – relative air humidity is 55% (we can consider 60%) – dew point is at 15.7°C (60.3°F). To ensure there will be no condensation, the floor surface must be at least at 18.5°C (65.3°F).

Section 3: Preliminary Operations

Application Requirements No coating should be applied unless surface temperature is a minimum of 2.8 degrees C above the dew point											
Air Temp.	Dew point temperature in degrees Celcius with a relative humidity (%) of:										
Celcius	0	10	20	30	40	50	60	70	80	90	100
0	–	- 27.9	- 20.2	- 15.4	- 12	- 9.2	- 6.8	- 4.8	- 2.8	- 1.4	0
1	–	- 27.2	- 19.3	- 14.5	- 11.1	- 8.2	- 5.8	- 3.8	- 1.9	- 0.4	1
2	–	- 26.4	- 18.5	- 13.7	- 10.2	- 7.3	- 5	- 2.8	- 1	0.6	2
3	–	- 25.6	- 17.7	- 12.9	- 9.4	- 6.4	- 4.1	- 1.9	0.1	1.5	3
4	–	- 24.8	- 16.8	- 12	- 8.5	- 5.5	- 3.1	- 1	0.8	2.5	4
5	–	- 24	- 15.9	- 11.2	- 7.6	- 4.6	- 2.2	- 0.1	1.8	3.5	5
6	–	- 23.1	- 15	- 10.3	- 6.6	- 3.7	- 1.3	0.8	2.8	4.5	6
7	–	- 22.3	- 14.2	- 9.4	- 5.7	- 2.8	- 0.4	1.8	3.8	5.5	7
8	–	- 21.6	- 13.5	- 8.5	- 4.8	- 1.8	0.6	2.3	4.8	6.5	8
9	–	- 21	- 12.8	- 7.6	- 3.8	- 0.8	1.6	3.8	5.8	7.4	9
10	–	- 20.2	- 12	- 6.7	- 2.9	0.1	2.5	4.8	6.8	8.4	10
11	–	- 19.5	- 11.1	- 5.9	- 2	0.9	3.5	5.7	7.8	9.4	11
12	–	- 18.7	- 10.2	- 5	- 1.2	1.7	4.4	6.6	8.7	10.4	12
13	–	- 17.9	- 9.4	- 4.2	- 0.3	2.6	5.3	7.5	9.7	11.4	13
14	–	- 17.2	- 8.6	- 3.3	0.6	3.5	6.2	8.5	10.6	12.3	14
15	–	- 16.4	- 7.8	- 2.4	1.5	4.5	7.2	9.5	11.6	13.3	15
16	–	- 15.7	- 6.9	- 1.5	2.4	5.5	8.1	10.5	12.6	14.3	16
17	–	- 14.9	- 6	- 0.7	3.3	6.5	9.1	11.5	13.5	15.3	17
18	–	- 14.1	- 5.2	- 0.2	4.2	7.4	10.1	12.4	14.5	16.3	18
19	–	- 13.2	- 4.5	1	5.1	8.3	11	13.4	15.4	17.3	19
20	–	- 12.5	- 3.6	1.9	6	9.3	12	14.3	16.4	18.3	20
21	–	- 11.7	- 2.8	2.7	6.8	10.2	12.9	15.3	17.4	19.3	21
22	–	- 11	- 2	3.6	7.7	11.1	13.9	16.3	18.3	20.3	22
23	–	- 10.3	- 1.2	4.5	8.6	12.1	14.7	17.2	19.3	21.2	23
24	–	- 9.6	- 0.3	5.4	9.5	12.9	15.7	18.2	20.3	22.2	24
25	–	- 8.8	0.5	6.3	10.4	13.8	16.7	19.2	21.3	23.2	25
26	–	- 8	1.3	7.1	11.3	14.8	17.7	20.2	22.3	24.2	26
27	–	- 7.3	2.1	7.9	12.2	15.8	18.5	21	23.2	25.2	27
28	–	- 6.5	3	8.7	13.1	16.7	19.5	22	24.2	26.2	28
29	–	- 5.7	3.8	9.6	14	17.5	20.4	23	25.2	27.2	29
30	–	- 5	4.6	10.5	14.9	18.4	21.4	24	26.2	28.2	30

In winter the risk of condensation is higher. It is suggested that appropriate dehumidifiers be used in order to reduce the air relative humidity. The ambient temperature also influences the resin's reaction speed. High ambient temperature increases that speed and reduces the working time of the material. Contrarily, a low temperature reduces the reaction speed and increases the working time.

Also, a low temperature increases the viscosity of the material, reducing the workability, whereas with a higher temperature the workability is increased. The right temperature to apply *Mapefloor CPU* products is between 8°C and 30°C (46°F and 86°F).

If ambient heating is required, do not use gas, oil or other fossil fuel heaters that produce large quantities of both carbon-dioxide and water vapour, which may adversely affect the finish. Use only electric powered warm air blower systems. The application of resins with rising temperature will increase the risk of pinholes. The maximum value of relative air humidity is 85%.

Section 4: System Application

The best application is done when the temperature of *Mapefloor CPU* is between 15°C and 25°C (59°F and 77°F). The material temperature influences the viscosity and the ease of mixing and application.

Material temperature also influences the working and hardening time. The material is faster in curing, but must be applied quickly.

At low temperatures, the materials become very thick and viscous and are difficult to level or smooth, whereas at the upper end, the speed of reaction makes it difficult to keep the wet edge and the product quickly forms a “cold” joint.

If a job-site’s ambient temperature is close to 10°C (50°F), it’s a good idea to create a separate and insulated storage and mixing area, such as the tent shown in the picture, in which a heating system creates a room temperature of between 18°C and 20°C (64°F and 68°F).

4.1 Mixing

In order to improve application properties, it is advised to shake or stir both A and B components very energetically, either by hand in their original containers or by means of an electric drill mixer. Pour *Mapefloor CPU* part A in a suitable container, then add part B and mix with a low-speed electric stirrer (300-400 rpm) for about 30 seconds until a homogeneous beige mix is achieved. Gradually add *Mapecolor CPU* (the pigment powder bag for every kit A+B of *Mapefloor CPU/HD*, *Mapefloor CPU/MF, Mapefloor CPU/RT* and *Mapefloor CPU/SBF*) and then add slowly and gradually all of part C over a period of at least 15 to 20 seconds. During the mixing operations, scrape down the sides and bottom of the container with a flat or straight edge trowel at least once to ensure complete mixing. The resin components of the product can be mixed with a hand electric mixer, as parts A and B are fluid. The preparation of the mortar mix requires heavy duty mixers such as a Ted Baugh mixer, rotary drums mixer, double axis forced action mixers, etc. Mix at low-speed (300 to 400 rpm) for at least 2 to 2.5 minutes until a homogeneous mix has been achieved.

For mixing of *Mapefloor CPU/COVE* and *Mapefloor CPU/TC*, proceed similarly, but add *Mapecolor Paste*.

Providing a continuous supply of freshly mixed material constitutes a key success factor to ensure an adequate job completion. Indicatively, the mixing times depending on the temperature would be according to this table.

Section 4: System Application

At higher temperatures, the mixing times can be slightly shortened thanks to the lower viscosity, which facilitates the mixing process, and to compensate the faster reaction times. Likewise, at lower temperatures, the mixing times must be slightly increased to improve the mixing result and thanks to the delayed reaction time this does not negatively influence the mixing process.

	MIXING PACE			8 HOURS
Temperature	**Time between mixes (min)**	**Mixing time (min)**	**Number of mixes per hour**	**Mixes per day**
25°C – 30°C (77°F – 86°F)	2.5	2	24	192
	3	2.5	20	160
20°C – 25°C (68°F – 77°F)	3.5	3	17.1	137.1
	4	3.5	15	120
15°C – 20°C (59°F – 68°F)	4.5	4	13.3	106.7
	5	4.5	12	96
10°C – 15°C (50°F – 59°F)	5.5	5	10.9	87.3
	6	5.5	10	80

A point of great importance is doing the mixing in clean containers for each mix. Not only can remaining material from previous mixes appear as hardened lumps in successive mixes, but as the reaction is exothermic, the container is heated progressively thus shortening the pot life (literally) of successive mixes.

Things not to do:

- Do not use a high-speed mixer.
- Do not over-mix, in order to reduce air entrapment.
- Do not change mixing ratio of parts A, B and C and pigment powder.
- Do not dilute the materials.
- Do not mix more material than can be placed within the working time with the available resources.
- Do not mix materials that have been stored under hot sun exposure or in freezing conditions.

Section 4: System Application

4.1.1 Primer

Before the application of *Mapefloor CPU/MF*, the substrate surface must be sound and pore-free. *Mapefloor CPU/MF* can be firstly applied as a scratch coat, 1.5 mm (1/16") thick, which will seal the surface, fill irregularities and improve the appearance of the final layer. This is best done with a straight edge trowel. The scratch coat must be fully hardened before the application of the following layer of *Mapefloor CPU/MF*. Allow at least 12 hours at 20°C (68°F) before applying the wearing course layer.

When the concrete floor requires a light surface strengthening, it's possible to apply *Primer SN* in 1 or 2 coats, by roller, squeegee or by steel trowel, and broadcast in the *Primer SN* with a quartz #32 mesh clean dry silica sand.

Prior to the application of the coving and detailing mortar *Mapefloor CPU/COVE*, prime the surface with *Primer SN* mixed according to the instructions indicated in its TDS. The primer must still be tacky when proceeding with the *Mapefloor CPU/COVE* application.

4.1.2 Heavy duty mortar screeds – *Mapefloor CPU/HD* and *Mapefloor CPU/RT* systems

Pour the mixed *Mapefloor CPU/HD* or *Mapefloor CPU/RT* and spread it by means of a steel trowel. The use of a screed box, a pin or gage rake can make the application faster and the thickness easier to be controlled. Keeping a continuous supply of mixed material and placing it efficiently will allow for the maintenance of "wet edge" to reduce the unavoidable differences between batches / fresh mixes, and material already starting to dry and set.

Once spread, lightly smooth the surface with a round edge steel trowel to remove joints between pours and or steel and gage rake marks. It is possible to lightly pass a short pile or loop roller (just once or maximum twice), to remove small trowel marks and make the surface color and texture a little bit more homogeneous. Excessive back-rolling makes the resin rise onto the surface, reducing the antiskid property and increasing the risk of pinholes.

Given the presence of the coarse aggregate on the surface, it is recommended to create the coves with *Mapefloor CPU/COVE* beforehand, to avoid an irregular appearance of the coving surface as the curved trowel passes over the aggregate-rich surface.

4.1.3 Self-leveling smooth – *Mapefloor CPU/MF* system

Pour the mixed *Mapefloor CPU/MF* and spread it by means of a long flat edge trowel or a serrated trowel. The use of the serrated trowel makes it easier to control the thickness applied, but can leave traces of sweep marks that are more noticeable with light colors. In those cases, to remove the marks, it's advisable to finish smoothing the surface with the flat edge of the trowel.

Immediately after laying the screed, quickly use a spiked roller to help de-airing of the screed. Make sure not to overuse the roller when the screed starts to gel, as visible marks will arise.

Keeping a continuous supply of mixed material nearby, and placing it efficiently, will allow for the maintenance of a "wet edge" to reduce the unavoidable differences between batches / fresh mixes, and material already starting to dry and set.

4.1.4 Antislip broadcast screed – *Mapefloor CPU/MF* or *Mapefloor CPU/SBF* system

If an anti-slip textured surface is required, the layer of *Mapefloor CPU/MF* or *Mapefloor CPU/SBF* must be fully broadcast with quartz sand (#32 or #24 mesh clean dry silica sand) depending on the texture required. Other aggregate types such as corundum or white aluminium oxide can be used for more demanding abrasion resistance requirements.

In those cases the use of the primer or of the scratch coat is not necessary, because the surface of the fully broadcast layer of *Mapefloor CPU/MF* or *Mapefloor CPU/SBF* usually doesn't show any pinholes. So the application of *Mapefloor CPU/MF* or *Mapefloor CPU/SBF* is made in one step, using a serrated trowel; the wet product is then fully broadcast with either quartz #32 mesh clean dry silica sand or quartz #24 mesh clean dry silica sand.

Once the base coat is hardened, remove most of the excess of quartz sand by sweeping. Then scratch the surface with sand-paper discs or with a straight trowel, used like a razor, to detach all loose or badly bonded quartz grains. Lastly, thoroughly remove all free quartz sand with a vacuum cleaner.

Surface pore-filler finish consists of the application of one coat of *Mapefloor CPU/TC* poured onto the floor surface and spread scratching the surface by means of a straight edge steel trowel, then back-rolled with a short pile roller.

4.2 Detailing and coving mortar – *Mapefloor CPU/COVE*

Apply *Mapefloor CPU/COVE* while the *Primer SN* applied on the substrate is still tacky. As an alternative, use a mixture of components A and B from *Mapefloor CPU/COVE* to prime the substrate. Apply the primer with a brush or roller, then immediately apply *Mapefloor CPU/COVE*, pressing it and moulding it to shape with a suitable plastic or metal tool.

When *Mapefloor CPU/COVE* has hardened, we recommend coating it with at least one coat of *Mapefloor CPU/TC* to seal the pores and make it easier to clean.

4.2.1 Coating and sealer – *Mapefloor CPU/TC*

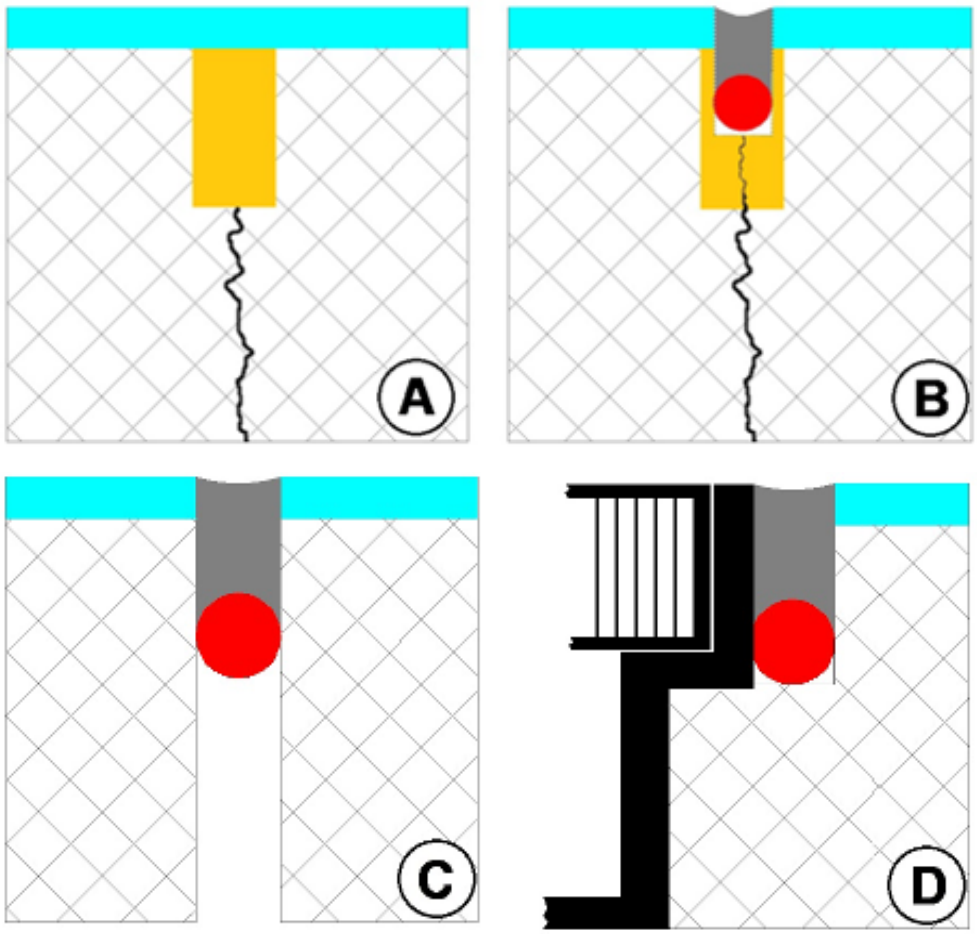
For better distribution of the product, we recommend pouring *Mapefloor CPU/TC* on the substrate and spreading it out in an even coat with a short or medium-haired roller on *Mapefloor CPU/RT*, *Mapefloor CPU/HD* or smooth *Mapefloor CPU/MF*, or with a steel trowel or squeegee if the surface to be coated is *Mapefloor CPU/MF* or *Mapefloor CPU/SBF* fully broadcast with quartz sand.

When coating walls or areas blended in between walls and floors or other features, apply the product directly with a roller after cleaning the surface and removing all traces of dust. Apply two coats of product in such areas.

Mapefloor CPU/TC may be treated with a second coat, or applied on the surface of other products from the *Mapefloor CPU* range, within 48 hours of them hardening at 20°C (68°F). Lower temperatures lead to longer waiting times while higher temperatures reduce these times. If this time is exceeded, the surface will have to be roughened mechanically. There is no time limit for coating *Mapefloor CPU/MF* or *Mapefloor CPU/SBF* when fully broadcast with quartz sand, so long as the surface is clean, with no traces of dust.

We recommend applying the product so that each batch is applied immediately after the previous one while it is still wet and workable to reduce the marks made by the joints.

Section 5: Details



5.1 Joints

All movement joints must be reflected on the coating surface (see picture “C”). They can be patched before the coating application, and after coating setting, they are sawed in the same position as the pre-existing joint.

Contraction joints, as well as all sawed and induced joints, should be theoretically static. They could be patched and covered with *Mapefloor CPU/HD*, *Mapefloor CPU/RT*, *Mapefloor CPU/MF* or *Mapefloor CPU/SBF* (they will work as retaining grooves), and it shouldn’t be necessary to saw them again (see picture “A”). However, if there is any small evidence or doubt that those joints can move, they must be reflected on the screed as dynamic joints mentioned before (see picture “B”). If not, *Mapefloor CPU/HD, Mapefloor CPU/RT*, *Mapefloor CPU/MF* or *Mapefloor CPU/SBF* will be damaged by movements.

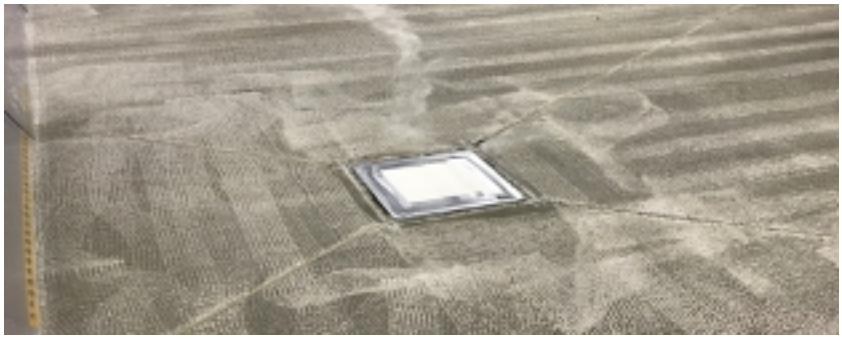
All those new joints will be sealed with a polyurethane sealant such as our *Mapeflex® P1 SL* single component, thixotropic, quick-hardening polyurethane sealant and adhesive, with high modulus of elasticity for sealing expansion and distribution joints. It is strongly recommended to apply a coating of *Primer SN* and insert Backing Rod Foam closed cell polyethylene foam cord, of adequate section, (25% larger than the nominal joint thickness of the joint), beforehand to obtain the required depth and prevent the sealant from sticking to the bottom of the joint.

Section 5: Details

5.2 Drain channels

All connections with drain channels, gullies, catch basin, etc. can be done by making a retaining groove on the edge, twice as deep and wide as the thickness of the screed. Edge coating terminations should be treated in the same way.

When different expansions due to thermal stresses are expected, e.g.: in the case of installation of prefabricated channels, a sealed joint as shown in the picture below will reduce the risk of cracks between the resin coating and the drainage channel (see picture "D" above). Ensure you use *Planibond® EBA* high-modulus epoxy bonding agent, with a full broadcast of #32 to #24 mesh the day before applying a sealed joint around the drain channel. This will ensure a mechanical bond between the metal pan and the *Planibond EBA*.

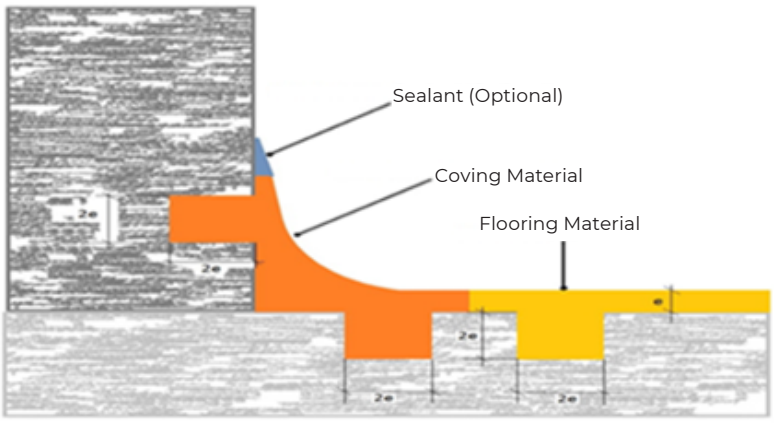


5.3 Coves

The floor to walls joint coves are probably the most critical details. There could be movements between the floor and the wall. In that case, a rigid cove will probably crack, so a prefabricated cove installed onto the coating surface is preferable.

Rigid coves can be done with *Mapefloor CPU/COVE*. After hardening, to reduce their porosity, they must be painted with *Mapefloor CPU/TC*. Grooves for the cove against the wall and the floor are also mandatory.

Given the presence of the coarse aggregate on the surface of *Mapefloor CPU/HD*, *Mapefloor CPU/RT* and *Mapefloor CPU/SBF*, it is recommended to create the coves with *Mapefloor CPU/COVE* beforehand, to avoid an irregular appearance of the coving surface as the curved trowel passes over the aggregate-rich surface.



Section 6: Tools and Equipment

Each installer must be provided with the minimum tools and equipment required.

Tools and equipment for surface preparation can be rented. The most commonly used items for surface preparation are the shotblaster, the scarifier, and the diamond-wheeled grinding machines. Small grinding tools, as a scabbler, are often used to prepare edges near the wall, pillars etc.

Minimum tools required: thermometer and moisture meter to check the dew point, brooms and vacuum machine, weighing scale, two electric stirrers with adequate mixing blade, clean containers, spiked shoes, spiked rollers, brushes and wool-rollers, steel and rubber trowels, serrated trowels, cleaning tools, etc.

Single axis for parts A & B

Double axis mixer for A + B + C + color for *Mapefloor CPU/HD, Mapefloor CPU/MF, Mapefloor CPU/RT and Mapefloor CPU/SBF*

Bucket mixer

Forced action mixers

Revolving pan type mixer

Screed box spreader

Screed rake

Section 7: Safety

Each installer must be provided with health and safety equipment like gloves, safety-glasses, safety-shoes, N95 respirators, helmet, etc. and they must use them.

All chemical products for construction must be handled in strict accordance with the respective products' Safety Data Sheets (SDSs), available on our Website, www.mapei.ca. For any further or more detailed information, please consult these documents.

When a new job-site starts, take note of the nearest hospital or emergency room.

All empty containers, used application tools, dust and waste materials, resin waste etc. must be disposed of according to local legislation.

Section 8: Acceptance Criteria

The resin floor coatings are systems applied on the job-site. The final aesthetic result will be influenced by ambient conditions, installer's skill, ambient pollution, insects, wind, floor surface conditions, slope and flatness, etc.

Mapefloor CPU screeds are high to medium thickness screeds. Depending on the above mentioned influences, the surface aspect may not be perfectly homogeneous. E.g.: the roughness could be slightly different in some areas, application tool marks may be visible, the slope and flatness may be almost the same as the concrete substrate, etc.

If those aspects do not affect the technical performance and properties, the floor must be accepted.

Section 9: Cleaning and Maintenance

All resin coatings and cementitious screeds require adequate maintenance. Cleaning operations must be done using adequate detergents and cleaning tools in order to remove all dirt and pollutants on the floor surface. Any spills of aggressive chemicals (oils, lubricants etc.), must be promptly removed. Any mechanical damage must be promptly repaired in order to avoid liquid penetration of the substrate.

The surface properties must be checked in the future; when there will be any evidence of any decrease of those properties, a new treatment with the same top finish used prior for the protection must be done.

Maintenance inspections should be done frequently, with respect to the kind of use and exposures present.

Regular cleaning and maintenance operations increase the life of the treated floor, improve its appearance, and reduce its capacity to collect dirt. Floors created using the *Mapefloor CPU* System are generally easy to wash with neutral detergents, or with alkali detergents diluted at a concentration of from 5% to 10% in water.

For further information, please refer to the specific Maintenance of Resin and Cementitious Flooring method statement and consult MAPEI's reference guide: "*Mapeoor CPU*: Maintenance Instructions" available on our Website at www.mapei.ca.

Intensive and aggressive cleaning regimes according to the requirements of the relevant industrial process can be implemented, including the use of steam jet cleaning. Occasionally, there may be some discoloration due to the chemicals used, without further affecting the performance of the floor.

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