

Mapefloor™ CPU Flooring Systems: Installation Instructions

Mapefloor CPU flooring systems are designed to protect concrete substrates from aggressive substances, for areas subjected to heavy-duty physical, chemical, and thermal, requirements as well as pedestrian and heavy vehicular traffic*. Mapefloor CPU flooring systems are typically specified for use on industrial and civil environments, especially in the food and beverage industry or where highly demanding cleaning regimes are in use.

For these reasons, there is a Mapefloor CPU flooring system designed to suit the individual requirements for almost every type of industrial project. This installation guide is intended to assist the contractor on proper procedures recommended by MAPEI toward achieving a successful application.

* Use of a Mapefloor CPU flooring system in areas subject to more demanding requirements than recommended on the particular product's Technical Data Sheet (TDS) may void any claim or warranty stated by MAPEI.

Condition of Concrete

- Concrete surfaces must be free of voids, ridges, fins, and other sharp projections and honeycombs.
- Concrete surfaces should be clean, sound, and free of laitance, loose aggregate, dirt, oil, grease, wax, curing agents, sealers, form-release agents and other contaminants that will affect the bonding of the coating.
- New concrete must have cured for at least 7 to 10 days (depending on its nominal design load and ambient conditions) and have a compressive strength of greater than 3,625 psi (25 MPa).
- The tensile strength of the concrete substrate after preparation should test at greater than or equal to 217.5 psi (1,50 MPa) per ACI 503R-93.
- New concrete that will receive Mapefloor CPU coatings should preferably be water-cured. In the event that a curing compound must be used, Mapecure™ DR dissipating resin is highly recommended; all other curing compounds require prior approval from MAPEI's Technical Services Department and must be removed before the application of the Mapefloor CPU flooring system.
- The surface of the concrete should be sloped to drains at a minimum of 1/8" per foot (3 mm per 0,30 m). If the proper slopes are not in place, use a base layer of Mapefloor CPU screed filled with 30% by weight of quartz aggregate between #3½ to #6 mesh. Alternatively, use Mapecem 102 or Mapecem 202 mortar according to the respective TDS.
- Ensure that all penetrations and drains are in place before installation of the concrete to avoid later penetrations after the Mapefloor CPU flooring system is installed.
- Concrete surfaces must be visibly dry. They can be saturated surface-dry (SSD).
- Existing concrete surfaces should be tested for hydrocarbons and other contaminants through petrographic analysis.

Surface Preparation for Concrete

- Shotblasting is the preferred method for preparing concrete surfaces. Mechanically prepare the surface according to the Technical Guideline 310.2R-2013 from the International Concrete Repair Institute (ICRI) to a concrete surface profile (CSP) of #3 at the minimum and up to #9, depending on the final thickness of the system to be applied.
- Alternatively, scarifying can be used as the substrate preparation method for heavy-duty screeds applied in high thickness.
- If necessary, chemically clean the concrete surface by scrubbing with detergents or use an appropriate commercial degreaser to remove oil, grease, curing/sealing compounds, heavy dirt and dust.
- Clean and treat all exposed reinforcing steel with MAPEI's Mapefer™ 1K corrosion-inhibiting coating before applying an appropriate repair mortar.
- 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, cutting grooves twice as wide and twice as deep as the thickness for 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., in any element that is a discontinuity of the screed. They must also be created at cold joints at the end and beginning of each daily application. The distance from the edge of joints, or discontinuous elements, of the finished screed can be between 2" and 4" (5 and 10 cm).
- Grind all ridges and sharp projections and repair all voids, honeycombs, bug holes and delaminated areas with a fast-setting concrete repair mortar such as MAPEI's Planitop® 18 or Planitop 18 ES or with the Mapefloor CPU mortar to be used for the screed with added aggregate. Alternately, repair



CSP 1:
Acid etched



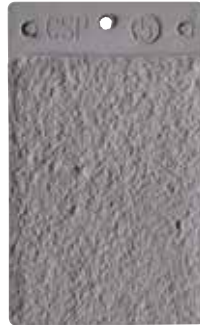
CSP 2:
Grinding



CSP 3:
Light shotblast



CSP 4:
Light scarification



CSP 5:
Medium shotblast



CSP 6:
Medium scarification



CSP 7:
Heavy abrasion blast



CSP 8:
Scabbled



CSP 9:
Heavy scarification

Concrete surface profiles per ICRI Technical Guideline 310.2R-2013

these areas with *Primer SN*™ mixed with sand at a ratio by volume of 1 part of epoxy per 3 to 5 parts of #20 to #40 mesh sand, or up to a ratio by weight of 1 part of resin per 12 parts of sand, until the desired consistency is achieved. Allow epoxy patching to cure for about 1 day at 75°F (24°C).

- Movement cracks must be treated with an elastic sealer and reflected through to the surface of the applied coating. Alternatively, they can be made rigid and re-cut on the substrate before application of an elastic sealer and reflected through the coating.
- Clean all dust and debris from concrete, and prime with *Primer SN*. Detail cracks from 1/32" to 1/16" (1 to 1,5 mm) in width with an appropriate polyurethane sealant like *Mapeflex™ P1*, extended at least 2" (5 cm) – or as defined by the engineer – on either side of the crack at an average layer thickness of 30 mils in dry film thickness (DFT), or 30 mils in wet film thickness (WFT).

- Larger cracks from 1/16" to 3/8" (1,5 to 10 mm) should be routed out or treated by abrasive blasting, and then blown clean before being sealed. They need not to be leveled as they will act as anchorages for the screed. Sealing the cracks will prevent the flow of *Mapefloor CPU* products into the cracks to show on the surface of the finished floor.
- Non-moving cracks greater than 3/8" (10 mm) should be routed out and repaired with an appropriate MAPEI repair epoxy like *Epojet™* or *Epojet LV*.
- Where required, create coverings with *Mapefloor CPU/COVE* detailing mortar, following mixing indications from the corresponding TDS. Always apply *Mapefloor CPU/COVE* over a tacky coat of *Primer SN*. Use a conveniently shaped trowel depending on the industry needs. Always re-prime should the primer become dry.
- Ensure that a 45-degree cant is made with a polyurethane sealant between floor/wall and floor/column applications.
- Clean the entire surface before application of the *Mapefloor CPU* screed or *Primer SN* by sweeping and vacuuming. Use *Primer SN* as an optional primer before placing *Mapefloor CPU/MF* as a self-leveling screed.
- Install keyways in the substrate at all terminations using a chipping gun or a crack chaser. Keyways are generally 1/4" (6 mm) deep, extend back 2" to 6" (5 to 15 cm) and are filled with coating. This makes the terminated edge more resistant to impact and brings the coating flush with another surface.

Temperature Requirements

- *Mapefloor CPU* flooring systems are designed to be applied at ambient temperatures between 46°F and 86°F (8°C and 30°C). Usage outside of this recommended temperature range can adversely affect proper application, as well as physical properties of the cured system.
- In temperatures below 50°F (10°C), the individual components of the *Mapefloor CPU* flooring system will have a thicker viscosity. This will result in products that are harder to mix and apply. If temperatures colder than 46°F (8°C) are expected overnight, the unopened, unused components of the *Mapefloor CPU* flooring system should be stored in a heated space.
- In temperatures above 77°F (25°C), the individual components of the *Mapefloor CPU* flooring system will have a thinner viscosity. Higher temperatures will also affect the pot life and open times, accelerating the curing and modifying final physical properties of the applied system. If ambient temperatures are higher than the recommended temperature range for application, the contractor should wait until cooler evening temperatures to apply the *Mapefloor CPU* flooring system, or acclimatize the materials and working area for proper application.
- The dew point is the temperature at which moisture will condense on a surface. The substrate temperature should be at least 5 degrees F (2,8 degrees C) higher than the dew point before product application and maintained at this level during curing. See the following charts for illustrations of calculating the dew point:

DEW POINT CALCULATIONS

Ambient air temperature (in Fahrenheit)

	20°F	30°F	40°F	50°F	60°F	70°F	80°F	90°F	100°F	110°F	120°F
90%	18°F	28°F	37°F	47°F	57°F	67°F	77°F	87°F	97°F	107°F	117°F
85%	17°F	26°F	36°F	45°F	55°F	65°F	75°F	84°F	95°F	104°F	113°F
80%	16°F	25°F	34°F	44°F	54°F	63°F	73°F	82°F	93°F	102°F	110°F
75%	15°F	24°F	33°F	42°F	52°F	62°F	71°F	80°F	91°F	100°F	106°F
70%	13°F	22°F	31°F	40°F	50°F	60°F	68°F	78°F	88°F	96°F	105°F
65%	12°F	20°F	29°F	36°F	47°F	57°F	66°F	76°F	85°F	93°F	103°F
60%	11°F	19°F	27°F	36°F	45°F	55°F	64°F	73°F	83°F	92°F	101°F
55%	9°F	17°F	25°F	34°F	43°F	53°F	61°F	70°F	80°F	89°F	96°F
50%	6°F	15°F	23°F	31°F	40°F	50°F	59°F	67°F	77°F	86°F	94°F
45%	4°F	13°F	21°F	29°F	37°F	47°F	58°F	64°F	73°F	82°F	91°F
40%	1°F	11°F	18°F	26°F	35°F	43°F	52°F	61°F	69°F	78°F	87°F
35%	-2°F	8°F	16°F	23°F	31°F	40°F	48°F	57°F	65°F	74°F	83°F
30%	-6°F	4°F	13°F	20°F	28°F	36°F	44°F	52°F	61°F	69°F	77°F

Example in Fahrenheit: If the ambient air temperature is 70°F and relative humidity is 65%, the dew point is 57°F. Therefore, no coating should be applied unless the substrate temperature is 5 degrees F higher than the dew point, or a minimum of 62°F (57°F + 5°F = 62°F).

Ambient air temperature (in Celsius)

	-7°C	-1°C	4°C	10°C	16°C	21°C	27°C	32°C	38°C	43°C	49°C
90%	-8°C	-2°C	3°C	8°C	14°C	19°C	25°C	31°C	36°C	42°C	47°C
85%	-8°C	-3°C	2°C	7°C	13°C	18°C	24°C	29°C	35°C	40°C	45°C
80%	-9°C	-4°C	1°C	7°C	12°C	17°C	23°C	28°C	34°C	39°C	43°C
75%	-9°C	-4°C	1°C	6°C	11°C	17°C	22°C	27°C	33°C	38°C	41°C
70%	-11°C	-6°C	-1°C	4°C	10°C	16°C	20°C	26°C	31°C	36°C	41°C
65%	-11°C	-7°C	-2°C	2°C	8°C	14°C	19°C	24°C	29°C	34°C	39°C
60%	-12°C	-7°C	-3°C	2°C	7°C	13°C	18°C	23°C	28°C	33°C	38°C
55%	-13°C	-8°C	-4°C	1°C	6°C	12°C	16°C	21°C	27°C	32°C	36°C
50%	-14°C	-9°C	-5°C	-1°C	4°C	10°C	15°C	19°C	25°C	30°C	34°C
45%	-16°C	-11°C	-6°C	-2°C	3°C	8°C	14°C	18°C	23°C	28°C	33°C
40%	-17°C	-12°C	-8°C	-3°C	2°C	6°C	11°C	16°C	21°C	26°C	31°C
35%	-19°C	-13°C	-9°C	-5°C	-1°C	4°C	9°C	14°C	18°C	23°C	28°C
30%	-21°C	-16°C	-11°C	-7°C	-2°C	2°C	7°C	11°C	16°C	21°C	25°C

Example in Celsius: If the ambient air temperature is 21°C and the relative humidity is 60%, the dew point is 13°C. Therefore, no coating should be applied unless the surface temperature is roughly 3 degrees C higher than the dew point, or a minimum of 16°C (13°C + 3°C = 16°C).

Mixing

- Before mixing, review the mixing instructions on each TDS of the associated products. Proper mix ratios, mixing times and equipment are essential for optimum *Mapefloor CPU* flooring system performance. Always mix full kits to avoid mistakes.
- When priming is necessary, to help ensure adequate coverage of the substrate, mix *Primer SN* with 20% of aggregate by weight, adding 7.11 lbs. (3,22 kg) or 9.33 parts of *Primer SN* per 1 part of sand by volume. Refer to the TDS of *Primer SN* for mixing instructions.

- For each of the *Mapefloor CPU* products in the various systems, premix Part A to a homogenous consistency (for 2 to 3 minutes), using a low-speed drill (at 300 to 450 rpm) and a paint-mixing paddle.
- Pour Part A into a clean mixing container. Then add Part B and mix thoroughly to a smooth, homogenous consistency and color. Add the corresponding dosage of the *Mapecolor™ CPU* or *Mapecolor Paste* and mix until the color is homogeneous. Finally slowly add Part C of the corresponding *Mapefloor CPU* product to the mixing container and continue mixing until a homogeneous appearance. To avoid trapping air, do not mix at high speeds.

Application of Coating System

Structure

In general, CPU flooring systems are composed of the following items:

- Base coat or body coat
- Intermediate layer, which is optional depending on the buildup
- Sealer or topcoat

Depending on the structure of the buildup, some or all of these layers may be partially filled or broadcast to different degrees (light, full or in excess) with aggregates.

General (materials)

- Mapefloor CPU/HD* and *Mapefloor CPU/RT* are self-priming, heavy-duty screeds that have a nonslip, lightly textured finish.
- Mapefloor CPU/MF* is a more fluid screed and achieves a smooth, matte surface. It can be applied as a broadcast system when sealed with *Mapefloor CPU/TC*.
- Mapefloor CPU/SB* is a self-leveling screed specifically designed for use as basecoat for a broadcast system to achieve a defined texture, depending on the aggregate of choice.
- Primer SN* two-component epoxy primer and is the primer of choice for the *Mapefloor CPU* flooring systems. For specific requirements, alternative primers may be available.
- Quartz – #20 mesh, clean, dry, silica sand
- Mapecolor CPU* is an active pigment powder that is added to each kit of the above screeds to provide color to the screed. It is readily available in three colors; all other colors are special-order.
- Mapefloor CPU/COVE* is a coving and detailing mortar that is primed with *Primer SN* while tacky and is pigmented using *Mapecolor Paste*.
- Mapefloor CPU/TC* is a fluid coating layer to seal the *Mapefloor CPU/COVE* or the *Mapefloor CPU* screeds or broadcast CPU systems. It is pigmented using *Mapecolor Paste*.
- Mapecolor Paste* is a pigment paste for adding into either *Mapefloor CPU/COVE* or *Mapefloor CPU/TC*.

General (system thickness)

The following buildups can be created with *Mapefloor CPU* systems.

- *Mapefloor CPU/HD* and *Mapefloor CPU/RT* are applied at 1/4" to 3/8" (6 to 9 mm).
- *Mapefloor CPU/MF* as a self-leveling screed is applied at 1/8" to 1/4" (3 to 6 mm).
- *Mapefloor CPU/SB* is applied at 3/16" to 1/4" (4,5 to 6 mm).

General (instructions)

- Surface profile, application technique/equipment, applicator mixing and laying rate, and waste can all affect the amount of wet coating applied to achieve proper thickness. Ensure that wet film gauges are used to verify the wet film thickness, and adjust as needed to achieve the correct dry film thickness (DFT).
- Before application, refer to the "Mixing" section above and to the TDSs of each system component.
- Liquid components and colors can be mixed using a single-shaft drill mixer.
- Heavy-duty screeds and self-leveling screeds can be mixed using forced-action mixers, pan-type mixers and double-shaft mixers.

Primer application method for horizontal surfaces

1. Priming is generally not required for the heavy-duty screeds *Mapefloor CPU/HD*, *Mapefloor CPU/RT* and *Mapefloor CPU/SB*.
2. The self-leveling screed *Mapefloor CPU/MF* is generally primed with a scratch coat of itself, or with *Primer SN* broadcast with #20 mesh quartz sand. *Mapefloor CPU/COVE* is also primed with *Primer SN*, and *Mapefloor CPU/COVE* must be applied while *Primer SN* is still tacky.
3. When priming is necessary, the *Mapefloor CPU* flooring system uses a total-solids, two-component epoxy primer, *Primer SN*, for use as a substrate surface sealer.
4. The additional quartz sand in the *Primer SN* mix as indicated on the TDS will ensure a minimum coverage rate over the entire surface, when applied using a steel trowel.
5. The subsequent broadcast of quartz sand (in various amounts depending on the system) will additionally provide mechanical grip to the buildup as well as the required texture to the surface.

Basecoat application method for horizontal surfaces

1. The heavy-duty screed basecoats can be applied using a screed box or pin rake, and then flattened with a straight steel trowel to the recommended coverage rates as defined in the corresponding TDSs. The use of a loop-roller or a short-pile roller, lightly passed back and forth once or twice, helps to remove any remaining trowel marks.
2. Self-leveling screeds can be applied using a straight or serrated steel trowel and then de-aired using a spike roller.

3. For broadcast systems, follow the basecoat with broadcast in excess of the surface using #32 mesh silica sand, evenly distributed, into the wet coating at a rate of 61.3 to 81.8 lbs. per 100 sq. ft. (3 to 4 kg per m²), and allow to cure for 24 hours at 73°F (23°C). When the coating is cured, remove the loose, excess aggregate by blowing, sweeping or vacuuming; then collect and discard the excess aggregate before applying the topcoat.

Topcoat application method for horizontal surfaces

- Once applied, most *Mapefloor CPU* screeds are ready for use. A topcoat of *Mapefloor CPU/TC* is required for the *Mapefloor CPU/MF* and *Mapefloor CPU/SB* broadcast systems, and is optional for *Mapefloor CPU/COVE*.

Safety, Storage and Cleanup

Safety

- Ensure that Safety Data Sheets for all system components are present at every jobsite.
- Use extreme caution when working on sloped areas, because wet coatings can be slippery.
- Be aware of possible damage to adjacent property. *Mapefloor CPU* flooring systems may blemish other surfaces such as brick, paint and plastic. Use drop cloths or masking as required.
- Keep all personnel out of areas being coated for 24 to 48 hours after the job is completed.
- Read all warnings and instructions on container labels and on the SDSs.
- The above information is based on standard industrial practices and meant only to outline the hazards, and are not meant to be all-inclusive. Nothing contained within this document should supersede local laws, codes, ordinances or other regulations, or the instructions of other manufacturers for the use of their products. Consult the Occupational Safety and Health Administration (OSHA) or Canada's Workplace Hazardous Materials Information System (WHIMS) regarding further details and compliance. Consult the SDSs regarding conditions not addressed here.

Storage

- All system components of *Mapefloor CPU* flooring systems should be stored in cool, shaded areas, preferably at an ambient temperature of 70°F (21°C). Consult each material's TDS for specific storage requirements.
- When work is stopped, ensure that all primers and coatings are stored in their tightly sealed containers. Do not keep any open containers in confined spaces.

Cleanup

- Clean tools that used to prepare and apply *Mapefloor CPU* flooring systems with polyurethane thinners immediately after use. Once hardened, *Mapefloor CPU* products may only be removed using mechanical means.

General

- *Mapefloor CPU* flooring systems are designed to be applied between the ambient temperatures of 45°F to 86°F (7°C to 30°C); for optimum

installation, the ambient temperature should be between 59°F and 68°F (15°C and 20°C). Store materials at 70°F to 77°F (21°C to 25°C) for 24 to 48 hours before installation and ensure that the substrate temperature does not fall below 45°F (7°C) when applying polyurethanes, or below 50°F (10°C) when applying total-solids epoxies. Colder temperatures will increase the viscosity of the *Mapefloor CPU* flooring systems' components and thereby increase the materials' resistance to mixing, flowing, spreading and troweling.

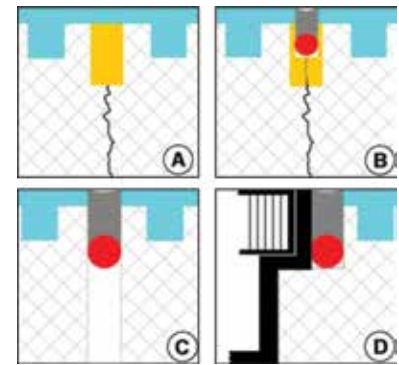
- All quantities indicated in this installation guide assume surfaces with a CSP of #3. Quantity estimates of materials will be affected by the surface profile changes, whether material is left in containers or whether the contractor applies more material than is required. Actual coverage will be less than theoretical coverage.
- Never coat wet or moist surfaces, especially when priming with *Primer SN*. When in doubt, utilize a moisture meter or perform a plastic mat test (reference ASTM D4263-83). Allow to dry to an SSD condition before application.
- Do not use solvents or thinners to dilute the materials.
- All asphalt surfaces should be removed before applying *Mapefloor CPU* flooring systems.
- As a general rule, all tiled substrates must be removed before applying *Mapefloor CPU* flooring systems, because the bedding mortar may be altered and provide insufficient bond strength.
- Shotblasting or another mechanical means approved by the project engineer is required on all concrete surfaces before applying *Mapefloor CPU* flooring systems. Consult a MAPEI Technical Services representative for specific job recommendations or for alternate methods of surface preparation.
- Mix all material components thoroughly before use. Read label instructions carefully.
- Do not mix combinations of different coating materials without consulting a MAPEI Technical Services representative.
- It is much easier to use caution or to use drop cloths or masking to keep a coating off an adjacent surface during application, than to remove the coating after it cures.
- Do not change the mixing ratio of parts A, B and C and the pigment.
- 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 a hot sun or in freezing conditions.
- Remember that, when used for coating, *Mapefloor CPU* resins must be applied over the primer within the recommended open time when no broadcast is used; otherwise, re-priming is required.
- When repriming, never allow the primer to overlap areas that have been coated with polyurethanes; otherwise, separation and blistering may occur.

- Calculating theoretical coverage: Any liquid, when applied at a thickness of 1 mil or 1/1000" (0,025 mm) will cover 1,604 sq. ft. per U.S. gal. (39,3 m² per L). To determine the yield per gallon/Liter, divide the area by the thickness measurement. Or, to determine the thickness, divide the area by the yield per gallon/Liter.

Approximate Coverage of <i>Mapefloor CPU</i> Mixed Units			
<i>Mapefloor CPU/HD</i>	<i>Mapefloor CPU/RT</i>	<i>Mapefloor CPU/MF</i>	<i>Mapefloor CPU/SB</i>
At 1/4" (6 mm) thickness: 27 to 29 sq. ft. (2,51 to 2,69 m ²)	At 1/4" (6 mm) thickness: 24 to 26 sq. ft. (2,23 to 2,42 m ²)	At 1/8" (3 mm) thickness: 75 sq. ft. (6,97 m ²)	At 3/16" (4,5 mm) thickness: 36 to 38 sq. ft. (3,34 to 3,53 m ²)
At 3/8" (9 mm) thickness: 17 to 19 sq. ft. (1,58 to 1,77 m ²)	At 3/8" (9 mm) thickness: 16 to 18 sq. ft. (1,49 to 1,67 m ²)	At 1/4" (6 mm) thickness: 38 sq. ft. (3,53 m ²)	At 1/4" (6 mm) thickness: 24 to 26 sq. ft. (2,23 to 2,42 m ²)

Joints

- All movement joints must be reflected on the coating surface (see Diagram C). They can be patched before the coating application and, after the coating sets, they should be sawed in the same position of preexisting joints.
- Contraction joints, as well as all sawed and induced joints, should be theoretically static. They could be patched and covered with *Mapefloor CPU* flooring systems (they will work as retaining grooves) and it shouldn't be necessary to saw them again (see Diagram A). But if there is any small evidence or doubt that those joints can move, they must be reflected on the screed as the movement joints mentioned earlier (see Diagram B). If not, *Mapefloor CPU* flooring systems will be damaged by movements.
- All those new joints should be sealed with a polyurethane sealant such as *Mapeflex P1* (see Diagram B).



Coves

- The floor-to-wall joint coves are probably the most critical details. There could be movements between the floor and the wall.
- Rigid coves can be created 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.

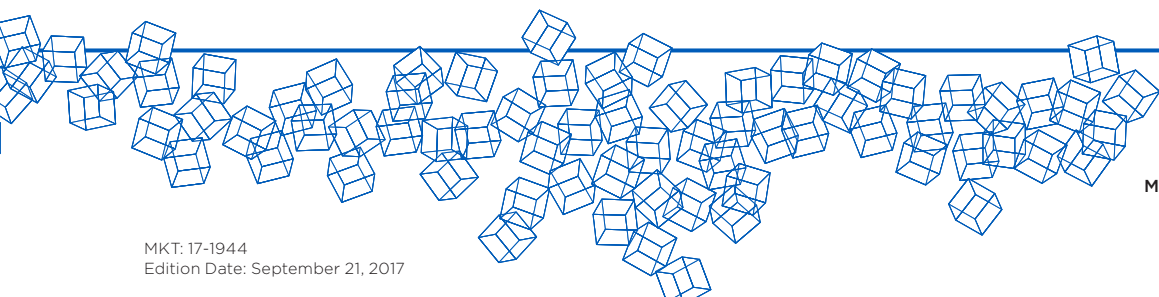
Chemical Resistance

Mapefloor CPU flooring systems are resistant to many common chemicals. These systems are widely used in production facilities warehouse and storage areas, mechanical rooms and other locations, which may expose the systems to incidental chemical contact.

Mapefloor CPU flooring systems are not recommended for industrial secondary containment that would involve long-term exposure to concentrated chemicals. For information about other high-resistance coatings, contact MAPEI's Technical Services Department.

Any coating system will stain if not properly maintained. Wash the system surface on a regular schedule to remove dirt, oils and other debris that may damage the coating. Chemical spills should be cleaned up immediately in accordance with local, state/provincial and federal laws. Consult MAPEI's installation guide titled "*Mapefloor CPU: Maintenance Instructions*" for details.

For specific recommendations on product suitability for the potential chemical exposure in your projects, consult MAPEI's Technical Services Department.



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