1. **GENERAL**
	1. **SUMMARY**
	2. This section specifies materials and workmanship for self-leveling topping and polishing.
	3. **REFERENCES**
2. ACI 302.1R-89, “Guide for Concrete Floor and Slab Construction”.
3. ACI 504 R-90, “Guide to Sealing Joints in Concrete Structures”.
4. ASTM C33, Specification for Concrete Aggregates”.
5. ASTM C881, “Specification for Epoxy Resin Base Bonding Systems for Concrete”.
6. ASTM C882, “Test Method for Bond Strength of Epoxy Resin Systems Used with Concrete”.
7. ASTM D523, “Standard Test Method for Measurement of Gloss of High-Gloss Surfaces by Abridged Goniophotometry”.
8. ASTM F1869, “Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride”.
9. ASTM F2170, “Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes”.
10. ICRI Technical Guideline No. 320.1R-1996, “Guide for Selecting Application Methods for the Repair of Concrete Surfaces”.
11. ICRI Technical Guideline No. 310.2R, “Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings and Polymer Overlays”.
12. ICRI Technical Guideline No. 320.2R, “Guide for Selecting and Specifying Materials for Repair of Concrete Surfaces”.
13. ICRI Technical Guideline No. 210.1, “Guide for Verifying Field Performance of Epoxy Injection of Concrete Cracks”.
	1. **SUBMITTALS**
14. Product Data: Submit manufacturer’s data and application instructions for specified materials.
15. Include Product Technical Data Sheets and Material Safety Data Sheets as requested.
16. Samples: Cured samples of materials as required by architect/engineer.
17. Qualification Data: For products required to be installed by workers approved by product manufacturer, include letters of acceptance by product manufacturer certifying installers are approved to apply their products.
	1. **QUALITY ASSURANCE**
18. Contractor shall have at least 5 years of experience in similar types of installations and must supply 3 references to projects of similar size and type.
19. Manufacturer shall provide job service as required to ensure proper handling and installation of materials. The field representative shall instruct as needed to ensure that handling, mixing, placing and finishing of materials are in accordance with specifications. Manufacturer shall be an ISO 9001:2000 certified supplier of specialty products and support services.
20. Pre-Installation Conference:
21. Arrange a meeting not less than 30 days before starting work.
22. Attendance: General Contractor, Architect/Engineer, Manufacturer's Representative, Testing Lab and Applicator’s Representative.

1. Source Limitations: Provide all repair materials, sealants, coatings, treatments and membranes from a single manufacturer.
	1. **DELIVERY, STORAGE, AND HANDLING**
2. Deliver materials to project site in manufacturer’s unopened containers with labels intact.

1. Materials shall be stored on site under dry conditions and protected from contamination.
	1. **PROJECT / ENVIRONMENTAL CONDITIONS**

1. Limitations for Epoxies: Do not apply when air and substrate temperatures are outside limits permitted by manufacturer. During hot weather, cool epoxy components before mixing. Do not apply to wet substrates unless approved by manufacturer. Refer to ASTM C881 and ASTM C882.
2. Use Class A epoxies when substrate temperatures are below or are expected to go below 5 degrees C (41 degrees F) within 8 hours.
3. Use Class A or B epoxies when substrate temperatures are below or are expected to go below 16 degrees C (60 degrees F) within 8 hours.
4. Use Class C epoxies when substrate temperatures are above 16 degrees C (60 degrees F).
5. Limitations for Cementitious Materials: Do not apply unless air temperature is between 10 and 35 degrees C (50 to 95 degrees F) and remains so for a minimum of 24 hours after completion of work.
6. New concrete must be cured properly for 28 days. Job conditions shall be maintained at standards that allow material placement within temperature and cleanliness requirements.
7. Unusual conditions as uncovered during the course of work shall be brought to the architect/engineer’s attention for analysis and disposition. These conditions include but are not limited to poor quality base concrete, severely corroded reinforcing steel, random cracks and deep oil penetration.
	1. **WARRANTY**
8. Deliver to architect signed copies of the following written warranties against defective materials and workmanship.
9. Manufacturer’s standard warranty covering materials.
10. Applicator’s standard warranty covering workmanship.
11. **PRODUCTS**

* 1. **MANUFACTURER**
1. The following materials as manufactured by MAPEI Inc. are considered to meet the requirements of this specification and shall be used as the basis for the selection of materials for each repair type.
2. MAPEI Inc., 2900 Francis-Hughes, Laval, QC, Canada, H7L 3J5. Toll Free Tel: 800-361-9309; Tel: 905-799-6884; Fax: 905-799-9870; Email: TServicesCA@mapei.com; Web: [www.mapei.ca](file:///C%3A%5CUsers%5Cjcamirand%5CAppData%5CLocal%5CMicrosoft%5CWindows%5CTemporary%20Internet%20Files%5CContent.Outlook%5C1QTVEPJN%5Cwww.mapei.ca).
3. MAPEI Corporation, 1144 E. Newport Center Rd., Deerfield Beach, FL 33442, USA. Toll Free Tel: 800-42-MAPEI; Tel: 954-246-8888; Fax: 954-246-8801; Email: mapeitechsvcs@mapei.com; Web: www.mapei.us.
4. No submittals for substitutions will be accepted after the bid date. All submittals for substitutions must be made in writing to the engineer with supporting technical data sheets and test data showing complete equivalent performance. Include list of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
	1. **MATERIALS**
5. Joint Filler:
6. MAPEI’s Planibond JF, two-component, moisture-tolerant, semi-rigid epoxy joint filler.
7. Epoxy Crack Repair:
8. MAPEI’s Epojet, high-modulus, low-viscosity epoxy injection resin for crack repair.
9. MAPEI’s Epojet LV, ultra low-viscosity epoxy injection resin for crack repair.
10. Epoxy Primer:
11. MAPEI’s Primer SN, two-component, pre-filled epoxy primer specifically designed to enhance adhesion of multi-layer flooring systems.

1. Self-Leveling Topping:
2. MAPEI’s Ultratop PC, high-flow, quick-setting, self-leveling topping optimized for polishing.

1. Densifier:
2. MAPEI’s Mapecrete Hard LI, water-based, lithium silicate densifier and sealer for concrete.
3. Coating:
4. MAPEI’s Mapecrete Protector FF, film-forming, high-gloss protective coating designed to increase the stain resistance of interior concrete floors.
5. **EXECUTION**
6. **PREPARATION**

1. Perform surface preparation in compliance with the most recent ICRI Technical Guideline No. 310.2. Concrete must be clean and textured. All oil, dirt, debris, paint and unsound concrete must be removed. The surface must be prepared mechanically using shotblasting, sandblasting, scarifying or other engineered-approved methods, to produce a surface profile matching CSP 2 to 3 per ICRI 310.2.
2. Concrete substrates should have a minimum tensile pull-off strength of 1.38 MPa (200 psi), and a minimum compressive strength of 20.7 MPa (3,000 psi) for pedestrian traffic and 27.6 MPa (4,000 psi) for vehicular traffic.
3. Substrate must be free from hydrostatic pressure and Moisture Vapour Emission Rate (MVER) must not exceed 2.27 kg per 92.9 square metres (5 pounds per 1,000 square feet) per 24 hours (per ASTM F1869) or 85 percent Relative Humidity (per ASTM F2170).
4. Cracks should be routed out or treated by abrasive blasting and blown clean with oil-free compressed air. Cracks should be V-notched to allow material access and create head pressure for adequate penetration.
5. **MIXING**
6. Mixing of joint filler (Planibond JF):
7. Cartridge:
8. Cut the nozzle static tip to the preferred opening for the job and remove the plug from the cartridge. Attach the static mixer with the nut and tighten.
9. Load the cartridge into the proper dispensing gun and dispense a bead of epoxy until the colour is uniform.
10. Pails:
11. Mix the 7.57 L (2 U.S. gallon) kit by opening Part A and Part B containers and mixing each part individually.
12. Pour full containers of Part A and Part B into a separate, clean mixing container. Mix with a low-speed drill (at 400 to 600 rpm) and Jiffy mixer until blended uniformly.
13. Mixing of epoxy crack repair (Epojet or Epojet LV):
14. Cartridge:
15. Cut the nozzle static tip to the preferred opening for the job and remove the plug from the cartridge. Attach the static mixer with the nut and tighten.
16. Load the cartridge into the proper dispensing gun and dispense a bead of epoxy until the colour is uniform.
17. Pails:
18. Mix the 11.3 L (3 U.S. gallon) kit by opening Part A and Part B containers and mixing each part individually.
19. Pour full containers of Part A and Part B into a separate, clean mixing container. Mix with a low-speed drill (at 400 to 600 rpm) and Jiffy mixer until blended uniformly.
20. Mixing of epoxy primer (Primer SN):
21. Premix the Part A resin to a homogeneous consistency (for 3 minutes) using a low-speed drill (at 300 to 450 rpm) and a Jiffy (paint mixer) mixing paddle to minimize trapped air. Pour the Part B hardener into the Part A container and mix thoroughly to a smooth, homogeneous consistency. Do not mix at high speeds, which can trap air within the mixed material. During the mixing process, scrape down the sides and bottom of the container to completely mix all of the components.
22. Mixing of self-leveling topping (Ultratop PC):
23. Barrel mixing:
24. Into a clean mixing barrel, pour 3.63 L (0.96 U.S. gallons) of cool, clean potable water per 22.7 kg (50 pound) bag of Ultratop PC. Slowly pour the Ultratop PC powder into the mixing barrel. Mix using a low speed drill (about 650 rpm) and an egg-beater mixing paddle to a homogeneous, lump free consistency for about 3 minutes.
25. Pump mixing:
26. Ultratop PC can be mechanically mixed, using the mixing ratio above, with a continuous mixer and pump with at least 30.5 m (100 feet) of hose or a batch mixer and pump with at least 15.2 m (50 feet) of hose. Mixer and pump must be in good working condition. Periodic cleaning of pumping equipment is required per the manufacturer’s instructions. Be sure to pressure-test rotor and stator for proper mixing. Use a mesh-screen sock at the end of the hose to catch any foreign material that could enter the hopper of the mixer.
27. Mixing of Densifier (Mapecrete Hard LI):
28. No pre-mixing or blending is required. Use directly from the container. Do not dilute.
29. Mixing of Coating (Mapecrete Protector FF):
30. Mix container contents until thoroughly blended. Do not dilute.
31. **INSTALLATION**
32. Epoxy joint filler (Planibond JF):
33. Install in non-moving floor joints where indicated. Joint depth is critical to a successful application, especially when subjected to steel-wheeled vehicle traffic. Saw-cut joints should be 25 percent of the thickness of the slab. That is, a 10 cm (4 inches) thick slab should be cut a minimum 2.5 cm (1 inch) deep. It is recommended that the full depth of the joint be filled with the epoxy joint filler for proper load transfer.
34. Joints should be filled full depth. Avoid using silica sand, backer rods or compressible fillers below the epoxy joint filler.
35. Pour mixed material into the joint, filling it approximately two-thirds its full depth. Allow filler to settle and then complete filling within 1 hour so that when cured, it is flush at top surface of adjacent concrete. If necessary, overfill joint and remove excess when filler has cured.
36. Epoxy crack repair (Epojet or Epojet LV):
37. If the cracks reflect through the substrate, seal the underside.
38. Apply the epoxy crack repair from the cartridge or pour directly neat from properly mixed units into the crack. Continue placement until the crack is completely filled.
39. Lightly sand-broadcast the surface of the exposed epoxy.
40. Epoxy primer (Primer SN):
41. After the concrete surface has been prepared and cleaned, apply one coat of epoxy primer with a 3 mm (0.125 inch) squeegee and back-roll with a caged roller with a 6 mm (0.25 inch) nap roller cover at a rate not to exceed 2 square metres per L (80 square feet per U.S. gallon) of mixed material. Coating thickness shall be a minimum 0.5 mm (20 mils) thickness.
42. Immediately after spreading the epoxy primer, broadcast sand over the surface of the still-wet primer. Broadcast to rejection, maintaining an even dispersion of sand. The sand must be oven-dried, graded, with a mesh size of 16 and free of fines. The amount of sand required is about 4.88 kg per square metres (1 pound per square feet).
43. Remove excess sand on the following day (after at least 16 hours) by sweeping and vacuuming off the excess.
44. Self-leveling topping (Ultratop PC):
45. Close doors and windows and turn off HVAC systems to prevent drafts during application and until the self-leveling topping is cured. Adjust ventilation system to prevent air movement across surface. Protect areas from direct sunlight.
46. Quickly pour the mixed self-leveling topping onto the properly prepared and primed surface in a ribbon pattern.
47. Set the width of the pour at a distance that is ideal for maintaining a wet edge throughout placement and in consideration of expansion and control joints.
48. Provide a continuous flow of wet material which will help to prevent trapping air or creating a cold joint.
49. Shortly after placing the self-leveling topping, spread the material with a gauge rake to assist in gauging out the self-leveling topping to the desired depth. After achieving the desired depth, smooth the surface with a smoother to obtain evenness. The thickness range of the self-leveling topping must be 10 mm to 5 cm (0.375 inch to 2 inches). Minimum thickness must be 12 mm (0.5 inch) when dealing with rolling dynamic rolling loads such as pallet trucks, forklifts, and other rubber-wheeled vehicles.
50. All existing expansion joints, isolation joints, construction joints and control joints, as well as any moving cracks, must be honoured up through the self-leveling topping. Saw cuts in the self-leveling topping shall be done as soon it is hard enough to accept light foot traffic, typically after 2 to 3 hours depending upon temperature and humidity conditions. Saw cuts in the self-leveling topping shall be full-depth and every 3 to 4.5 m (10 to 15 feet) in every direction. The joint filler material within the self-leveling topping should include a bond breaker tape or backer rod at the bottom of the joint to ensure two-sided bonding only.
51. **POLISHING**
52. Allow the self-leveling topping to cure 24 to 72 hours depending on the machine weight.
53. If the self-leveling topping has cured for longer than 7 days or a lightweight polishing machine is being used, begin the grinding process by using 30- to 40-grit metal-bonded diamond pads (XPS 30). Polish with this gritted pad first in a north-south direction, and then in an east-west direction, to achieve an even scratch pattern.
54. If the self-leveling has cured for less than 7 days or a heavier polishing machine is being used, begin the grinding process with 60- to 80-grit metal-bonded diamond pads (XPS 70). If this is the first cut of the self-leveling topping, polish with this gritted pad twice first in a north-south direction, and then in an east-west direction, to achieve an even scratch pattern.
55. Polish with 120- to 140-grit metal-bonded diamond pads (XPS 120), first in a north-south direction, and then in an east-west direction.
56. Polish with 50-grit transitional diamond pads (STI #3) in a north-south direction.
57. Polish with 100-grit transitional diamond pads (STI #4) in an east-west direction.
58. Polish with 200-grit resin-bonded diamond pads (STI #5) in a north-south direction.
59. Polish with 400-grit resin-bonded diamond pads (STI #6) in an east-west direction.
60. Remove all dust by sweeping with a microfiber mop.
61. At this time, a liquid-silicate-based densifier can be applied. Remove all excess material. Do not allow excess densifier to dry on the surface. Any areas showing patches of white on the floor should be immediately flooded with water and scrubbed.
62. Polish with 800-grit resin-bonded diamond pads (STI #7) in a north-south direction.
63. Polish with 1,500-grit resin-bonded diamond pads (STI #8) in an east-west direction.
64. Remove all dust by sweeping with a microfiber mop.
65. Apply the coating using a low pressure, pump-up sprayer with a 1.9 L per minute (0.5 U.S. gallon per minute) fan spray tip, working from one control joint to another. Lightly wet a microfiber mop with the coating and spread the damp mop over the sprayed material, keeping a wet edge. Stop spreading when drying begins and do not overlap. Allow to dry until tack-free, typically 20 to 60 minutes. Apply a second coat and repeat the coating procedure.
66. Once the coating has dried use a burnishing machine at greater than 2,000 rpm along with a 3,000-grit burnishing pad to burnish the coating into the surface of the self-leveling topping.
67. **MAINTENANCE**
68. Daily Maintenance
69. After a minimum of 72 hours; routinely sweep, dry mop, or use of a high-quality micro-fiber dust mop is the best method. Do not expose to water or other liquids for at least 7 days. A neutral pH cleaner only may be used when soils or stains must be removed. Any standing water should be removed immediately after cleaning.
70. An auto-scrubber may be used if equipped with a vacuum system to remove any standing water. The equipment tank should be filled with clean water only, with no chemicals. The scrubber should be equipped with a soft pad only; do not use a brush attachment.
71. Weekly Maintenance
72. An auto-scrubber may be used if equipped with a vacuum system to remove any standing water. The equipment tank should be filled with clean water only, with no chemicals. The scrubber should be equipped with a soft pad only,; do not use a brush attachment.
73. Use of a burnisher equipped with a burnishing pad may be used as needed to restore gloss to specified levels. An 800, 1,500, or 3,000 grit pad is recommended.
74. Gloss Maintenance
75. Maintaining a high-gloss floor will require additional frequency of cleaning procedures regardless of the amount of traffic.
76. Daily cleaning with dry micro-fiber or water only is a must. The surface must be kept clean of any dirt, dust and debris that can affect the gloss level of the floor.
77. An auto-scrubber may be used if equipped with a vacuum system to remove any standing water. The equipment tank should be filled with clean water only, with no chemicals. The scrubber should be equipped with a soft pad or a 3,000 grit burnishing pad only; do not use a brush attachment.
78. The floor should be burnished weekly using 3,000 grit burnishing pad on a high-speed burnisher. If the auto-scrubber or floor machine has been used daily with the 3,000 grit pad, then this step may not be required.
79. Extended Maintenance
80. As to the longevity of the stain and wear layer, this is dependent upon many factors such as traffic, wear patterns and environmental issues. It is recommended to conduct a semiannual inspection typically before and after winter to determine whether the desired area needs remedial work. Remedial work can consist of a re-burnish to remove light scratches as well as re-buff the floor for a superior shine, or a recoat of the stain protector to rejuvenate and refresh the high traffic or wear areas.

 .5 For maintenance details, refer to the “Mapefloor Resin Flooring: Maintenance Instructions” reference guide in the Technical Library for the Cementitious and Resin Flooring Systems product line at www.mapei.ca.

END OF SECTION