



By CTS Cement Manufacturing Corp.

CSI SECTION 03 50 00 – CAST DECKS AND UNDERLAYMENT
03 54 00 – CAST UNDERLAYMENT
03 54 16 – HYDRAULIC CEMENT UNDERLAYMENT

Fast-Setting, High Strength, Cementitious & Non-Shrink Underlayment

EDITOR NOTE: The following guideline specification has been prepared to assist architects and design professionals in the preparation of project master specifications. It is intended for use by qualified design professionals and is not intended to be used verbatim. Appropriate modifications to meet specific project requirements are required. Make appropriate [selections] where options are provided and delete items that are not applicable to the project. Contact CTS Cement Technical Service for additional information or project specification assistance.

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Supply and installation of a fast-setting, high strength, cementitious & non-shrink underlayment for interior and exterior flooring installations.

1.2 RELATED SECTIONS

- [A. Section 03 30 00 - Cast-in-Place Concrete

1.3 REFERENCES

- A. ASTM C109 Standard Test Method for Compressive Strength of Hydraulic Cement Mortars
- B. ASTM C219 Standard Terminology Relating to Hydraulic Cement
- C. ASTM C348 Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars
- D. ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
- E. ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
- F. ASTM F2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes
- G. ACI 302.1R-04 Guide for Concrete Floor and Slab Construction



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1.4 SUBMITTALS

- A. General: Submit samples and manufacturer's product data sheets, installation instructions, maintenance procedures, project references, etc. in accordance with Division 01 General Requirements Submittal Section.
- B. Test Data: Submit qualified testing data that confirms compliance with specified performance requirements.
- C. Maintenance Data: For inclusion in maintenance manual required by Division 01.
 - a. Include manufacturer's instructions for maintenance of installed work, including methods and frequency recommended for maintaining optimum condition under intended use.
 - b. Include precautions against cleaning products and methods which may be detrimental to finishes and performance.

1.5 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer:
 - a. Must have marketed fast-setting, high strength, cementitious materials in the United States for at least five years and must have completed projects of the same general scope and complexity.
 - b. Overlay and complementary materials must be manufactured by or approved for use by CTS Cement Manufacturing Corp. (800-929-3030, www.CTScement.com) and distributed by the same or an authorized CTS Cement dealer.
 - 2. Applicator:
 - a. Must be experienced and competent in installation of fast-setting, high strength, cementitious materials and provide evidence of a minimum of five years experience in work similar in size and scope to that required by this section.
 - b. Must retain sufficient production capability, facilities, and personnel to produce specified work.
 - c. Must provide proof of current placement on the CTS Preferred Applicator List. Temporary listings must be approved in writing by an authorized CTS Cement Manufacturing Technical Representative at least 15 days prior to installation and are required to have an authorized CTS Representative on site for initial application.
- B. Samples:
 - 1. Submit samples for approval. Samples must be of materials specified and of suitable size as required to accurately represent each color and texture used on project. Prepare each sample using the same tools and techniques for actual project application.
 - 2. Maintain and make approved samples available at the job site throughout the construction process and until final acceptance.
 - 3. Mock-Up: Provide a mock-up of the complete system sample panel, sized to [enter sample mock-up dimensions], using workmen, equipment, and techniques proposed for use on the project.
 - a. Mock-up must be reviewed for uniformity of depth and thickness, finish color and texture, and overall quality of construction.
 - b. The approved panel will become the standard of comparison for finished work for the project.



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- c. The approved panel must remain on site throughout the construction process and until final acceptance.
 - d. Approved mock-up may become part of the completed work if undisturbed at time of substantial completion.
 - e. Upon project completion and final acceptance, dispose of the sample in accordance with local construction waste guidelines.
- C. Walkway Auditor:
- 1. Certified by CPAA or NFSI to test polished concrete floors for dynamic and static coefficient of friction according to ANSI B101.1 and B101.3.

1.6 PRE-INSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at the Project Site located at [enter site address] at least two (2) weeks prior to initial underlayment placement.
- B. Organize meeting to review specification requirements and finished aesthetics. Require representatives of each entity directly concerned to attend, including the following:
 - [1. Owner.
 - [2. Architect.
 - [3. Contractor's Superintendent/Supervisor.
 - [4. Overlay & Polishing Subcontractor(s), including Finishers and Supervisor.
 - [5. Complementary Hardeners, Sealers, Colorants Manufacturer(s).
 - [6. Underlayment Manufacturer's Representative.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver products in original, unopened, undamaged packaging with manufacturer's identification (i.e., brand logo, product name, weight of packaged unit, lot number). Maintain records of manufacturer's product lot numbers.
- B. Storage: Store products in a dry location, covered, out of direct sunlight, off the ground, and protected from moisture. Maintain storage temperature required by the manufacturer. Keep materials dry until used. Store bulk sand in a well-drained area on a clean, solid surface. Cover sand to prevent contamination. Protect materials from temperature extremes.
- C. Handling: Handle products in accordance with manufacturer's published recommendations.



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1.8 SITE / ENVIRONMENTAL CONDITIONS

- A. Temperature: Maintain ambient and surface temperatures between 50°F (10°C) and 90°F (32°C). Do not apply materials if ambient temperature falls below 50°F (10°C) within 24 hours of application. Protect materials from uneven and excessive evaporation during dry weather, windy conditions and strong blasts of dry air.
- B. Inclement Weather: Do not apply materials during inclement weather unless appropriate protection is employed.
- C. Sunlight Exposure: Avoid, whenever possible, installation of materials in direct sunlight which could adversely affect aesthetics.
- D. Substrate: Prior to installation, the substrates must be inspected for surface contamination or other conditions that may adversely affect the performance of the materials and be free of residual moisture.
- E. Comply with manufacturer's written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation and other conditions affecting product performance.
- F. Damage and Stain Prevention: Take precautions to prevent damage and staining of substrates and surfaces to be polished before and after installation.
 - 1. Protect areas to receive polished topping at all times to prevent oils, dirt, metal, excessive water and other potentially damaging materials from affecting the finished surface.
 - 2. Prohibit use of markers, spray paint, and soapstone.
 - 3. Prohibit vehicle traffic over surfaces. If necessary to complete a scope of work, drop cloths or other suitable materials must be placed under vehicles at all times.
 - 4. Prevent staining by hydraulic-powered equipment fluids.
 - 5. Prohibit steel from being placed on the finished surface to avoid rusting.
 - 6. Prohibit pipe-cutting operations over surfaces.
 - 7. Prohibit ferrous metals storage over surfaces.
 - 8. Protect from petroleum, oil, hydraulic fluid, or other liquid dripping from equipment working over surfaces.
 - 9. Protect from acids and acidic detergents contacting substrates and surfaces to be polished.
 - 10. Protect from painting activities.
 - 11. All trades must be informed that the surfaces must be protected at all times.
 - 12. Installed topping area must be closed to traffic during finish floor application and after application for the length of time recommended by the manufacturer.

1.9 COORDINATION AND SCHEDULING

- A. Coordinate installation of materials with all other trades to avoid impeding other construction.
- B. Sufficient manpower must be provided to ensure continuous application and timely finishing.



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PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: CTS Cement Manufacturing Corp., 12442 Knott Street, Garden Grove, CA 92841 (800-929-3030, www.CTScement.com).
- B. Components: Obtain underlayment and complementary materials manufactured by CTS Cement from authorized distributors. No substitutions or additions of other materials are permitted without prior written permission from the manufacturer for this project.

2.2 MATERIALS

- A. Concrete Repair Materials and Toppings
 - 1. Self-Leveling Underlayment shall be Rapid Set® LevelFlor®.
- B. Primer
 - 1. Primer shall be Rapid Set® Acrylic Primer or Rapid Set® TXP™ Epoxy Primer.
- C. Utilize manufacturer’s recommended specifications, proportions, mix ratios, additives and proprietary components as required for specific applications, and as approved by Architect/Engineer.
- D. Clean, potable water free of deleterious amounts of silt and dissolved salts.

2.3 MATERIAL PERFORMANCE

- A. Fast Setting, High Strength, Non-Shrink Cementitious Underlayment
 - 1. Minimum performance requirements:

Compressive Strength (ASTM C109 Modified*)	24 hours	3,000 psi
	7 days	3,500 psi
	28 days	5,000 psi
Tensile Strength (ASTM C348 Modified*)	7 Days	1150 psi, minimum

**Data obtained at 70° F (21° C)*

2.4 RELATED MATERIALS

EDITOR NOTE: *Modify to suit project scope and requirements.*

- A. Repair Materials: Products designed to repair cracks and surface imperfections prior to application of underlayment material.
 - 1. Rapid Set® Cement All®: a pre-packaged, high-performance, fast-setting, multi-purpose, non-metallic, cementitious, non-shrink grout and concrete repair material mixed with water on site. Suitable for use in wet environments and any application where high durability and rapid strength gain are desired. Structural strength is achieved in one (1) hour. Suitable for structural and non-structural applications. Applied at 0 to 4" depth.



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2. Rapid Set® Mortar Mix: a pre-packaged, trowel grade, high-performance, fast-setting, multi-purpose, non-metallic, cementitious repair material [with integral air entrainment] mixed with water on site. Suitable for indoor and outdoor use, use in wet environments, and for any application where high durability, rapid strength gain and low shrinkage are desired. Structural strength is achieved in one (1) hour. Suitable for structural and non-structural applications from 1/2 in. to 6 in. depths.
3. Rapid Set® Concrete Mix: a pre-packaged, trowel grade, high-performance, fast-setting, multi-purpose, non-metallic, cementitious repair material [with integral air entrainment] mixed with water on site. Suitable for indoor and outdoor use, use in wet environments, and for any application where high durability, rapid strength gain and low shrinkage are desired. Structural strength is achieved in one (1) hour. Suitable for structural and non-structural applications from 2 in. to 24 in. depths.
4. Metzger/McGuire Rapid Refloor: a 100% solids, two-component, low viscosity structural polyurea/polyurethane hybrid intended for use in repairing cracks and small surface defects such as bolt holes and pop-outs in industrial, retail or commercial concrete floors.

2.5 JOINT AND CRACK FILL MATERIALS

- A. Saw Cut Contraction/Construction Joint Filler and Crack Filler
 1. Metzger/McGuire Spal-Pro RS 88 Semi-Rigid Polyurea Joint Filler.
 2. Metzger/McGuire MM-80®/MM-80P Semi-Rigid Polyurea Joint Filler.
 3. Metzger/McGuire Rapid Refloor.
- B. Color to match adjacent finished floor surface.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Installer shall examine and approve concrete substrate for conditions affecting performance of finish. Installer shall correct conditions that are found to be out of compliance with the requirements of this section to include installing a pre-leveling layer as recommended by CTS Cement Manufacturing Corporation.
- B. All surface defects shall be repaired using materials described in 2.1 A.
- C. Provide a concrete substrate surface that has been mechanically prepared to an ICRI CSP 3 and is clean of all contaminants and debris.
- D. If application includes divider/terrazzo strips, level and set strips to appropriate heights prior to the pour of LevelFlor®.
- E. Pin or otherwise mark all existing joint locations to ensure they can be located and re-saw cut after placement of topping.
- F. Prime the prepared concrete using Rapid Set® Acrylic Primer in accordance with manufacturer's recommendations and time restrictions.

3.2 APPLICATION

- A. Install Rapid Set® LevelFlor® in accordance with manufacturer's instructions to include careful monitoring of the amount of mix water being used, with allowance for the following special designs:
 1. Any aggregates used and the loading shall be as recommended and approved by the manufacturer.
 2. Batch mixers by CS Unitec (Hippo Mixer) or Strong Manufacturing are the preferred methods of mixing LevelFlor®.



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3. If Barrel Mixing, use a 1/2" heavy-duty drill (12 mm) with a minimum of 650 rpm. Mix two (2) bags of LevelFlor® with the specified amount of water in a mixing barrel using a "helix style" mixing paddle. Mix thoroughly for 3-5 minutes to obtain a lump-free mixture.
4. Clean barrels/mixers periodically or use a 1/8" screen (#8 Classifier) to remove any unmixed and/or hardened material prior to placing the mixed LevelFlor® onto the floor.
5. Place LevelFlor® to grade levels required and to conform to details on drawings.
6. Pour, trowel or pump materials.
7. Place LevelFlor® up to 2" inch deep in a neat pour.
8. Alternately, for thicknesses greater than 2" up to 5", extend each 50-pound bag of material with 25 pounds of clean 3/8" pea gravel.

3.3 JOINT CUTTING, PREPARATION AND FILLING

- A. Allow topping to cure for a minimum of sixteen (16) hours prior to saw cutting joints.
- B. Locate original joint locations and saw cut through topping into the original joint. Saw blade shall penetrate to depth of original joint or 2" deep, whichever is the lesser.
- C. Ensure saw-cut joint is completely free of dust/debris/laitance.
- D. Apply stain prevention film or other masking agent along surface on both sides of the joint if residual staining may be a concern.

3.4 PROTECTION

- A. Prevent damage to underlayment and protect from all traffic for the length of time recommended by the manufacturer.
- B. Protect the finished surfaces from damage, soiling and other construction activities.
- C. Provide suitable protective cover without damaging the surface.
- D. Follow maintenance guidelines as provided in Section 1.4 Submittals.

3.5 CLEAN-UP

- A. Remove and legally dispose of debris material from job site.
- B. Clean excess material from surrounding areas and all tools immediately, before material cures. If materials have cured, remove using mechanical methods that will not damage the substrate.
- C. Clean adjacent surfaces as needed using materials and methods recommended by the manufacturer of the material being cleaned. Remove and replace work that cannot be cleaned to the satisfaction of the Project Designer/Owner.

END OF SECTION

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This sample guideline specification is intended for use by a qualified design professional. The sample guideline specification is not intended to be used verbatim as an actual specification without appropriate modifications for the specific project requirements.