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This Manu-Spec® utilizes the Construction Specifications Institute (CSI) *Project Resource Manual* (PRM), including *MasterFormat*™, *SectionFormat*™ and *PageFormat*™. A Manu-Spec is a manufacturer specification using the proprietary method of specifying applicable to project specifications and master guide specifications. Optional text is indicated by brackets [ ]; delete optional text in final copy of specification. Specifier notes precede specification text; delete notes in final copy of specification. Trade/brand names with appropriate product model numbers, styles and types are used in specifier notes and in the specification text article titled "Acceptable Material." Metric conversion, where used, is soft metric conversion.

This Manu-Spec specifies hydraulic cement based self-leveling compound for filling, patching, smoothing and leveling of interior and exterior substrates.

SECTION 03 54 16
HYDRAULIC CEMENT UNDERLAYMENT

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: This section specifies hydraulic cement based self-leveling liquid compound for filling, patching, smoothing and leveling interior and exterior substrates.

Specifier Note: Revise paragraph below to suit project requirements. Add section numbers and titles per CSI MasterFormat and specifier's practice.

B. Related Requirements:

Specifier Note: Include in this paragraph only those sections and documents that directly affect the work of this section. If a reader of this section could reasonably expect to find a product or component specified in this section, but it is actually specified elsewhere, then the related section number(s) should be listed in the subparagraph below. Do not include Division 00 documents or Division 01 sections, as it is assumed all technical sections are related to all project Division 00 documents and Division 01 sections to some degree. Refer to other documents with caution, as referencing them may cause them to be considered part of the contract.

1. Section [___].
2. Section [09 65 19.19 - Vinyl Composition Tile Flooring].
3. Section [09 65 19.23 - Vinyl Tile Flooring].

1.2 REFERENCES

Specifier Note: Define terms unique to this section and not provided elsewhere in the contract documents. Include terms unique to the work result specified that may not be commonly known in the construction industry. Delete the following paragraph if no definitions are required.

A. Definitions:
   1. Friable: Substrate material easily crumbled or pulverized.

Specifier Note: List retained standard(s) referenced in this section alphabetically. Indicate issuing authority name, acronym, standard designation and title. Establish policy for indicating edition date of standard referenced and update as applicable. Contract Conditions Section 01 42 00 - References may be used to establish the edition date of standards. This paragraph does not require compliance with standard(s). It is a listing of all references used in this section. Only include here standards referenced in the body of the specification in PARTS 1, 2 or 3. Do not include references to building codes at any level.

B. Reference Standards:
   1. ASTM International (ASTM).
      a. **A**STM C109/C109M Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or [50 mm] Cube Specimens).
      b. ASTM C136/C136M Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
      c. ASTM C191 Standard Test Method for Time of Setting of Hydraulic Cement by Vicat Needle.
      d. ASTM C348 Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars.
      e. ASTM C1583/C1583M Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method).
      f. ASTM D4060 Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
      g. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
      h. ASTM E136 Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750° C.
      i. ASTM E1155 Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers.
   2. South Coast Air Quality Management District (SCAQMD).
      a. SCAQMD Rule 1113 Architectural Coatings.
   3. Underwriters Laboratories, Inc. (UL):
      a. ANSI/UL 723 Standard for Test for Surface Burning Characteristics of Building Materials.
   4. US Green Building Council (USGBC).
      a. LEED Version 4 (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations.

Specifier Note: Article below includes submittal of relevant data to be furnished by Contractor before, during or after construction. Coordinate this article with Architect's and Contractor's duties and responsibilities in Contract Conditions and Section 01 33 00 - Submittal Procedures.

1.3 SUBMITTALS

A. Product Data: Manufacturer's standard specifications and descriptive literature, including:
   1. Product characteristics.
   2. Performance criteria.
   3. Safety Data Sheets (SDS).

Specifier Note: Specify submittals intended to document manufacturer storage, installation and other instructions.

B. Manufacturer's written instructions, including:
   1. Delivery, storage and handling recommendations.
   2. Preparation and application recommendations.

C. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.

D. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

E. Manufacturer's Field Reports: Submit manufacturer's field reports within 3 days of each manufacturer representative's site visit and inspection.

Specifier Note: Coordinate article below with Contract Conditions and with Section 01 78 36 - Warranties.

F. Installer's Experience: Installers will be experienced in performing work of this section and specialized in work similar to that required for this project; INSTALL certified or equal.

G. Warranty: Fully executed, issued in [Owner's] name and registered with manufacturer, including:
   1. Manufacturer's 10-year warranty, from date of substantial completion, covering defects in materials.

Specifier Note: Retain the following only if specifying for a LEED project. Specify only the technical submittal requirements necessary to achieve the credits desired for this project. For Schönox DSP, Schönox SL, Schönox US, Schönox ZM and Schönox ZM Rapid, the possible total for LEED v4 is 7.

H. Sustainable Design (LEED) Submittals:
   1. LEED Submittals: In accordance with Section [01 35 21 – LEED Requirements].
   2. Submit verification for items when appropriate as follows:
      a. EQc2 - Low-Emitting Materials: 3.
      b. MRc1 - Building Reuse — Maintain Existing Walls, Floors and Roof: 2.
      c. MRc2 - Construction Waste Management: 1.
      d. MRc4 - Recycled Content: 1.

1.4 QUALITY ASSURANCE

A. Installer: Experienced in performing work similar to work of this section.

1.5 DELIVERY, STORAGE & HANDLING

A. Deliver materials in accordance with manufacturer's written instructions.
   1. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact and product name and manufacturer clearly visible and sized to suit project.

B. Store materials protected from exposure to harmful environmental conditions, clean, dry, frost-free and at recommended temperature and humidity levels.

Specifier Note: Select 59 degrees F for Schönox DSP; select 41 degrees F for Schönox SL, US, ZM or ZM Rapid.

   1. Do not store materials at temperatures lower than [41] [59] degrees F and lower than 90 degrees F.

1.6 EXISTING CONDITIONS

A. Apply self-leveling underlayment only when substrate temperature is greater than [41] [59] degrees F and lower than 90 degrees F.

1.7 WARRANTY

A. Manufacturer's 10-year Warranty: Manufacturer's standard comprehensive warranty document executed by authorized company official.

B. Project Warranty: Submit request for Owner's acceptance is in addition to and not intended to limit other rights Owner may have under Contract Conditions of manufacturer's standard comprehensive warranty document.

PART 2 PRODUCTS

Specifier Note: Add product attributes performance characteristics, material standards and descriptions in other articles as applicable. Use of such phrases as "or equal," "approved equal" or similar phrases may cause ambiguity in specifications. Such phrases require verification (procedural, legal and regulatory) and assignment of responsibility for determining "or equal" products.

2.1 MANUFACTURER

A. Schönox, HPS North America, Inc.; 511 Wilhite Street, Florence, AL 35630; Phone: (855) 391-2649, (256) 246-0345; Fax: (256) 246-0346; Email: info@hpsubfloors.com; Website: www.hpsubfloors.com.

2.2 PERFORMANCE REQUIREMENTS

Specifier Note: Retain and edit the following paragraph related to compressive strength and choose 3700 psi if specifying Schönox SL; choose 4200 psi if specifying Schönox US; choose 5800 psi if specifying Schönox ZM; choose 7250 psi if specifying

Schönox DSP; choose 7550 psi if specifying Schönox ZM Rapid.

A. Compressive Strength: To ASTM C109, [3700] [4200][5800][7250] [7550] psi at 28 days.

Specifier Note: Retain and edit the following paragraph related to flexural strength and choose 1000 psi if specifying Schönox US; choose 1300 psi if specifying Schönox ZM or Schönox SL; choose 1550 psi if specifying Schönox ZM Rapid or Schönox DSP.

B. Flexural Strength: To ASTM C348, [1000] [1300] [1550] psi at 28 days.

Specifier Note: Retain and edit the following paragraph related to tensile strength and choose 350 psi for Schönox US; choose 400 psi for Schönox ZM; choose 450 psi if specifying Schönox ZM Rapid or Schönox DSP. Tensile strength is not applicable to Schönox SL. Delete the following paragraph if specifying Schönox SL.

C. Tensile Strength: To ASTM C1583, [350] [400] [450] psi after 3 days.

Specifier Note: Retain the following paragraph related to abrasion resistance if specifying Schönox DSP; delete the paragraph if specifying Schönox ZM, Schönox ZM Rapid, Schönox SL or Schönox US.

D. Abrasion Resistance: To ASTM D4060, 1.4 at 28 days.

E. Setting Times to ASTM C191:

Specifier Note: Retain and edit the following paragraph related to initial setting times and choose 35 minutes if specifying Schönox ZM Rapid; choose 60 minutes if specifying Schönox ZM; choose 80 minutes for Schönox US or Schönox DSP. Delete the following paragraph for Schönox SL.

1. Initial Set: approximately [35] [60] [80] minutes at 70 degrees F.

Specifier Note: Retain and edit the following paragraph related to final setting times and choose 45 minutes if specifying Schönox ZM Rapid; choose 70 minutes if specifying Schönox ZM; choose 95 minutes for Schönox US or Schönox DSP. Choose 20 minutes if specifying Schönox SL.

2. Final Set: approximately [20] [45] [70] [95] minutes at 70 degrees F.

Specifier Note: Edit the following paragraph related to timing when product can accept foot traffic and choose 20 minutes if specifying Schönox SL; choose 1-1.5 hours if specifying Schönox ZM Rapid; choose 2 hours if specifying ZM; choose 4 hours if specifying Schönox US; choose 2-3 hours if specifying Schönox DSP.

3. Foot-traffic Ready: [20 minutes] [[1-1.5] [2] [2-3] [4] hours]] minimum.

Specifier Note: Retain and edit the following paragraph related to when product is able to be covered by other materials. Schönox SL can be covered after 20 minutes when applied as a true featheredge; check with the manufacturer when covering very large areas. Choose 1.5-2 hours if specifying Schönox ZM Rapid; choose 24 hours for up to 1/4 inch layer thickness or 48 hours for up to 3/8 inch layer thickness if specifying either Schönox ZM or Schönox US. Delete paragraph if specifying Schönox DSP.

F. Covering Time: [20 minutes] [[1.5-2] [24] [48] hours] minimum with up to [1/4] [3/8] inch layer thickness.

G. Fire Burning Characteristics:
   1. UL Certified to:
      a. ANSI/UL 723.
      b. ANSI/ASTM E136.
   2. ASTM E84
      a. Flame spread: 0.
      b. Smoke developed: 0.

H. VOC: 0 g/l to SCAQMD Rule 1113.

2.3 DESCRIPTION

Specifier Note: Retain and edit the following paragraph. Only Schönox US and Schönox DSP can be used for exterior applications; choose interior only for Schönox ZM, Schönox ZM Rapid or Schönox SL.

A. Hydraulic cement based self-leveling compound for filling smoothing and leveling substrates of [interior] [and] [exterior] applications

2.4 MATERIALS

A. Underlayment system: [Interior] [Exterior] use hydraulic cement based self-leveling, low VOC underlayment [capable of permitting feathered edges on sloped substrates].

Specifier Note: Retain and edit the following paragraph to suit project requirements. Choose the first option when specifying Schönox SL. Choose 60 square feet per 25 lbs bag if specifying Schönox ZM Rapid; choose 60 - 70 square feet per 55 lbs bag if specifying either Schönox ZM or Schönox US; choose 28-32 square feet at 0.25 inch if specifying Schönox DSP. Contact the manufacturer directly to determine coverage for underlayment thicknesses other than the options specified below.

1. Coverage: [[200] square feet per 10 lbs bag when applied as true featheredge] [[60] [60 - 70] square feet per [25] [55] lbs bag at 1/8 inch thickness]] [28 - 32 square feet at [0.25] inch depth.

Specifier Note: Retain and edit the following paragraph to specify layer thicknesses for Schönox ZM, Schönox ZM Rapid, and Schönox US when no aggregates are added to the mix. Delete the following paragraph if specifying Schönox SL. Schönox ZM without aggregates can be applied in thicknesses of 1/6 to 3/8 inches or Schönox DSP can be applied in thicknesses of 1/4" to 2" depending on aggregate used; Schönox ZM Rapid without aggregates can be applied in thicknesses of 1/16 to 1/2 inches; Schönox US without aggregates can be applied in thicknesses of 1/8 to 1 1/2 inches. Delete the following paragraph if specifying Schönox SL.

2. Layer thickness without aggregates: [____] inches.

Specifier Note: Retain and edit the following paragraph to specify layer thicknesses for Schönox ZM, Schönox ZM Rapid, and Schönox US with aggregates added to the mix. With aggregates added to the mix, Schönox ZM can be applied in thicknesses of 1/6 to 1 inches; with aggregates added to the mix, Schönox ZM Rapid can be applied in thicknesses of 3/8 to 1 inches; with aggregates added to the mix, Schönox US can be applied in thicknesses of 1/8 to 2 3/8 inches; with aggregates, DSP can be applied in thicknesses of 1/8 to 2 inches. Delete the following paragraph if specifying Schönox SL.

3. Layer thickness with aggregates: [____] inches.

Specifier Note: Retain and edit the following Paragraph only if Schönox SL is being specified as a feather edge.

4. Layer thickness: [____] inch

Specifier Note: Retain and edit the following paragraph to suit project requirements. For self-leveling of interior hydraulic cement and gypsum substrates to 7/8" thickness, choose ZM; for time-sensitive self-leveling of interior hydraulic cement and gypsum substrates to 7/8", choose ZM Rapid; for water, moisture and frost-resistant self-leveling of interior and exterior hydraulic cement and gypsum substrates of 1/8" to 2 3/8" thickness, choose US; for a self-leveling featheredge for patching, smoothing and finishing interior surfaces, choose SL; for wear-rated self-leveling and concrete topping of interior or exterior hydraulic concrete substrates of 1/8" to 2" thickness, choose DSP.

5. Acceptable Material: [Schönox ZM] [Schönox ZM Rapid] [Schönox US] [Schönox SL] [Schönox DSP]

B. Primer: In accordance with manufacturer's written recommendations and to SCAQMD Rule 1113.

Specifier Note: Retain and edit the following paragraph to suit substrate conditions. Choose Schönox VD (1.3) for standard absorbent concrete or cement substrates. Choose Schönox SHP for non-absorbent smooth, sound substrates such as ceramic tile. If substrate has been sanded and then vacuumed choose Schönox KH FX. Contact the manufacturer directly for more information on application usage.

1. Acceptable Material: [Schönox VD (1.3)] [Schönox SHP] [Schönox EPA] [Schönox KH FX].

2.5 ACCESSORIES

A. Reinforcing Mat: Multiaxial glass fiber fabric.
   1. Acceptable material: Schönox Renotex.

B. Repair Compound: In accordance with manufacturer's written recommendations.
   1. Acceptable Material: Schönox Repair Compound.

C. Residual Moisture Mitigation: Moisture suppressor in accordance with manufacturer's written recommendations.
   1. Ensure moisture suppressor meets requirements of SCAQMD Rule 1113.

D. Specifier Note: Retain and edit the following paragraph to suit substrate conditions. Contact the manufacturer directly to determine the most effective residual moisture suppressor for the project substrate conditions.

Specifier Note: Retain and edit the following paragraph to suit substrate conditions. Contact the manufacturer directly to determine the most effective residual moisture suppressor for the project substrate conditions.

   1. Acceptable Material: [Schönox SDG] [Schönox MR 18] [Schönox EPA] [EPA Rapid].

E. Sand: Fine sand aggregate to ASTM C136/C136M.

PART 3 EXECUTION

3.1 INSTALLER

A. Use only installers who have training and experience in performing work of this section and specialized in work similar to that required for this project; INSTALL certified or equal.

3.2 EXAMINATION

A. Verification of Conditions: Verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for underlayment application in accordance with manufacturer's written recommendations.
   1. Ensure substrate is smooth, sound, clean and free of contaminants which may hinder adhesion.
   2. Visually inspect substrate in presence of Architect or General Contractor.
   3. Inform Architect or General Contractor of unacceptable conditions immediately upon discovery.
   4. Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Architect or General Contractor.
   5. Starting application of hydraulic cement underlayment implies substrate conditions are acceptable for Work of this Section.

3.3 PREPARATION

A. Mechanically remove friable substrate materials and repair areas to smooth finish using repair compound and methods in accordance with manufacturer's written recommendations.

Specifier Note: Retain and edit the following paragraph to suit substrate conditions only if moisture is an issue.

B. Mitigate moisture using residual moisture suppressor and methods in accordance with manufacturer's written recommendations.

Specifier Note: A reinforcing mat is not always required. The following paragraph should be retained or deleted to meet specific project requirements. Contact the hydraulic cement underlayment manufacturer directly for advice on the use of a reinforcing mat.

C. Lay reinforcing mat in accordance with manufacturer's written recommendations.

3.4 MIXING

Specifier Note: Retain and edit the following paragraph to suit product specified. For Schönox ZM choose 55 lb bag with 6.6 to 6.8 quarts of water; for Schönox ZM Rapid choose 55 lbs bag with 6.1 quarts of water; for Schönox US choose 55 lbs bag with 4.7 quarts of water; for Schönox SL choose 10lb bag with 2 quarts of water; for Schönox DSP choose 55 lbs bag with 4.5/4.7 quarts of water.

A. Mix each [55 lbs bag with 6.6 to 6.8] [55 lbs bag with 6.1] [55 lbs bag with 4.5/4.7] [55 lbs bag with 4.7] [10lb bag with 2] quarts of water.
   1. Mix in accordance with manufacturer's written recommendations.
      a. Do not over water.
   2. Mix thoroughly for 3 minutes minimum using heavy duty drill mixer.

Specifier Note: Delete the following Paragraph if aggregates are not required.

      a. Add aggregates in accordance with manufacturer's written recommendations.

b. Mix thoroughly for 3 minutes minimum using heavy duty drill mixer.

Specifier Note: Retain and Edit the following paragraph. Schönox SL must be used within 15 minutes of mixing. Do not mix more than can be used within 15 minutes.

c. Use mixture within [15] [30] minutes of mixing.

3.5 APPLICATION

A. Prime substrate in accordance with manufacturer's written recommendations.

B. Pour self-leveling underlayment onto substrate and spread using smoothing trowel.

Specifier Note: Retain and edit the following Paragraph only if a second layer is required to achieve a thicker underlayment. Delete the following paragraph if a single layer will provide adequate underlayment coverage.

C. Prime first layer only after it has reached final set and only when second layer is required.
1. Use primer and methods in accordance with manufacturer's written recommendations.
2. Pour second layer over primed first layer and spread using smoothing trowel.
3. Ensure second layer does not exceed thickness of first layer.

Specifier Note: Retain and edit the following paragraph to suit project conditions. A spike roller is recommended for greater thickness pours.

D. Ensure surfaces are even and level using [pin leveler] [spike roller].

3.6 FIELD QUALITY CONTROL

A. Field Inspection: Coordinate field inspection in accordance with Section [01 45 00 Quality Control].

Specifier Note: Specify requirements if manufacturers are to provide field quality control with onsite personnel for instruction or supervision of product installation, application, erection or construction. Manufacturer field reports are included under PART 1, Submittals.

B. Manufacturer's Services:

Specifier Note: Use the following Paragraphs only when manufacturer's field services are provided and are required to verify the quality of the installed components. Establish the number and duration of periodic site visits required by manufacturer and specify below. Contact Schönox, HPS North America, Inc., to determine any costs associated with Technical Representatives providing manufacturer's field services. Delete if field services are not required.

1. Coordinate manufacturer's services with Section [01 45 00 - Quality Control].

Specifier Note: Delete the following paragraph if no costs are associated with manufacturer's services.

2. Arrange for payment for manufacturer's services.
3. Have manufacturer review work involved in handling, application, protection, and cleaning of hydraulic cement underlayment and submit written reports in acceptable format to verify compliance of Work with Contract conditions.
4. Manufacturer's Field Services: Provide manufacturer's field services consisting of product use recommendations and periodic site visits for product installation review in accordance with manufacturer's instructions.
   a. Report any inconsistencies from manufacturer's recommendations immediately to Architect or General Contractor.

Specifier Note: Edit the following paragraph to meet project requirements. Coordinate site visits with manufacturer or delete the Paragraph and all of its subparagraphs if site visits are not required.

5. Schedule site visits to review work at stages listed:
   a. After delivery and storage of hydraulic cement underlayment, and when preparatory work on which Work of this Section depends is complete, but before application begins.
   b. During progress of work.
   c. Upon completion of Work, after cleaning is carried out.
   d. Obtain reports within three days of review and submit immediately to Architect or General Contractor.

3.7 CLEANING

A. Immediately clean tools in water.
   1. Leave work area clean at end of each day.
B. Upon completion, remove surplus materials, rubbish, tools and equipment.
C. Collect recyclable waste and dispose of at appropriate recycling facilities.

Specifier Note: Specify protection methods completed after installation, but prior to acceptance by the owner. Include only statements unique to this Section. Coordinate the following Article with Section 01 76 00 - Protecting Installed Construction.

3.8 PROTECTION

A. Protect applied cement underlayment from damage during construction.
   1. Place temporary wood planking over finished cement underlayment work as directed by Architect or General Contractor.
B. Repair or replace adjacent materials damaged by application of hydraulic cement underlayment.

END OF SECTION