Specification for Producing a High Friction Surface
Treatment on Concrete or Asphalt Using Epoxy or Methyl
Methacrylate Binder and Aggregate

An ACI Standard

Reported by ACI Committee 548

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This Specification describes the work of producing a high-friction surface treatment (HFST) on asphalt and concrete by the application of an epoxy or methyl methacrylate binder and aggregate broadcast. The HFST incorporates a low-modulus polymer binder and selected aggregate to produce a flexible, high-friction (skid-resistant) pavement surface. The HFST may be used for both new or existing pavements and structures. The HFST is placed by applying the neat epoxy or methyl methacrylate binder to the surface and broadcasting aggregate onto it. This Specification includes requirements for components of the polymer binders, aggregates, storage and handling, surface preparation, surface profile, mixing, and placement.

**Keywords:** aggregates; asphalt pavements; concrete pavements; epoxy binder; methyl methacrylate binder; polymer application; quality control; skid resistance.

**CONTENTS**

**Part 1—General**

1.1—Scope

1.2—Units of measurement

1.3—Reference standards

1.4—Definitions

1.5—Submittals

1.6—Quality assurance

1.7—Product delivery, storage, and handling

1.8—Project conditions

**Part 2—Materials**

2.1—General
2.2—Products

**Part 3—Execution**

3.1—Trial application

3.2—Manufacturer representative

3.3—Surface preparation

3.4—HFST application

3.5—Field quality control

3.6—Cleanup

Notes to Specifier

Foreword to Checklists

Mandatory requirements checklist

Optional requirements checklist

Foreword to checklists

Mandatory Requirements Checklist

Optional Requirements Checklist

Submittals Checklist
PART 1—GENERAL

1.1—Scope

1.1.1 This reference specification covers the production of a high-friction surface treatment on asphalt and concrete pavements by the application of epoxy or methyl methacrylate resins binder and broadcast aggregate.

1.1.2 The provisions of this Specification shall govern unless otherwise specified in the Contract Documents.

1.2—Units of measurement

Values in this specification are stated in inch-pound units. A companion specification in SI units is also available.

1.3—Reference standards

Standards of ASTM International cited in this Specification are listed by name and designation, including year.

1.3.1 ASTM International standards

ASTM C25-17 Standard Test Methods for Chemical Analysis of Limestone, Quicklime, and Hydrated Lime

ASTM C566-13 Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying

ASTM C579-18 Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes

ASTM C778-17 Standard Specification for Standard Sand

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2 ASTM C884/C884M-16 Standard Test Method for Thermal Compatibility between Concrete and an Epoxy Resin Overlay
3 ASTM C1583/C1583M-13 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)
5 ASTM D638-14 Standard Test Method for Tensile Properties of Plastics
6 ASTM D1310-14 Standard Test Method for Flash Point and Fire Point of Liquids by Tag Open-Cup Apparatus
8 ASTM D3278-96(2011) Standard Test Methods for Flash Point of Liquids by Small Scale Closed-Cup Apparatus

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1.4—Definitions

**Architect/Engineer**—the architect, engineer, architectural firm, or engineering firm issuing Contract Documents or administering the Work under Contract Documents, or both.

**Contract Documents**—set of documents that form the basis of a contractual relationship between and Owner and Contractor or design-builder. These documents are defined by the contractual agreement, and can contain contract forms, contract conditions, specifications, drawings, addenda, and contract changes.

**Contractor**—the person, firm, or entity under contract for construction of the Work.

**Submittal**—document or material provided to the Architect/Engineer for review or acceptance.

**Work**—the entire construction or separately identifiable parts thereof required to be furnished under Contract Documents.

1.5—Submittals

1.5.1 Submit a certificate of compliance and quality control test results verifying conformance to material specifications in Part 2 for each manufactured batch of epoxy or methyl methacrylate binder and lot of aggregate. A lot or batch is a quantity of material manufactured at one time and placed into containers.
1.5.2 Submit material and product data sufficient for the Architect/Engineer to evaluate the
system, including all installation instructions and quality control procedures required.

1.5.3 Submit safety data sheets.

1.5.4 Submit Quality Control Plan within 14 days of the proposed start of the work. Unless
otherwise specified, the plan shall include the following information:

a) Schedule for the trial high-friction surface treatment (HFST) work and production of HFST
   work

b) Key personnel and contact information

c) Epoxy or methacrylate binder production plants and location of plants

d) Aggregate production plants and location of the plants

e) Name of the certified independent testing laboratory

f) All project certifications and test results

g) Methods to control aggregate moisture

h) Description of equipment for placing HFST.

i) Method for metering, mixing, placing, and finishing the HFST.

j) Method for protecting areas not to receive HFST.

k) Description of acceptable environmental conditions for placing HFST.

l) Cure time and time to open to traffic estimates for HFST as a function of temperature

m) Method for determining cure for opening to traffic

n) Procedures for storage of material

o) Disposal and recycling of excess HSFT materials and empty containers

p) Contingency plan for possible failure during the HFST application
q) Corrective actions to be taken for unsatisfactory construction practices and deviations from specifications

r) Designate a Quality Control Manager who shall have full authority to institute any action necessary for the successful operation of the Quality Control plan; the QC Plan must be approved by the Architect/Engineer prior to the contractor placing any HFST.

1.6—Quality assurance

1.6.1 Labeling—Clearly mark all containers with the following information:

a) Name of manufacturer

b) Manufacturer’s product identification

c) Manufacturer’s instructions for mixing

d) Warning for handling and toxicity

e) Expiration date

1.6.2 Quality control plan—follow Quality Control Plan.

1.7—Product delivery, storage, and handling

1.7.1 Delivery of materials—Deliver all materials in sealed containers with labels legible and intact.

1.7.2 Storage of materials—Store resins, hardeners, and aggregate in an area that prevents them from getting wet. Store away from open flames and other sources of ignition. Store resins, hardeners and aggregate at temperatures between 50 and 100°F unless otherwise recommended by the material manufacturer.

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1.7.3 Handling of materials—Handle all materials in a safe manner and in a way to avoid breaking container seals.

1.8—Project conditions

1.8.1 Environmental requirements—Contractor shall comply with manufacturer’s recommendations as to environmental conditions under which the epoxy or methyl methacrylate binder may be applied.

1.8.2 Disposal of materials—Dispose of unused materials in accordance with safety data sheets.

PART 2—MATERIALS

2.1—General

2.1.1 Description—This part covers requirements for materials and application of an epoxy or methyl methacrylate binder and broadcast aggregate high-friction surface treatment (HFST).

2.2—Products

2.2.1 Epoxy binder—Epoxy binder and high-friction surface treatment (HFST) shall meet the requirements listed in Tables 2.2.1a and 2.2.1b. Do not use epoxy binder containing solvents and unreactive diluents.

Table 2.2.1a—Properties of mixed, uncured epoxy binder

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
<th>Test method</th>
</tr>
</thead>
</table>

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<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
<th>Test method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viscosity</td>
<td>700 to 2500 cps</td>
<td>ASTM D2556</td>
</tr>
<tr>
<td>Gel time</td>
<td>10 to 45 minutes</td>
<td>ASTM C881/C881M (modified 70 mL)</td>
</tr>
<tr>
<td>Flash point</td>
<td>greater than 199°F</td>
<td>ASTM D3278</td>
</tr>
</tbody>
</table>

Note: Material and curing conditions at 73 ± 2°F (21 ± 1°C) and 50 percent relative humidity.

Table 2.1b—Properties of epoxy high-friction surface treatment

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
<th>Test method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressive strength*</td>
<td>greater than 1 ksi (3 hours)</td>
<td>ASTM C579, Method B</td>
</tr>
<tr>
<td></td>
<td>greater than 5 ksi (24 hours)</td>
<td></td>
</tr>
<tr>
<td>Elongation</td>
<td>30 to 70 percent</td>
<td>ASTM D638 Type 1</td>
</tr>
<tr>
<td>Thermal compatibility*</td>
<td>Pass</td>
<td>ASTM C884/C884M, Method B</td>
</tr>
</tbody>
</table>

*Samples should be made using 2.75 volume parts 20-30 sand per ASTM C778, No. 20 to No. 30 sieve to one volume part of mixed epoxy.

2.2.2 Methyl methacrylate binder—Methyl methacrylate binder and HFST shall meet the requirements listed in Tables 2.2.2a and 2.2.2b.

Table 2.2a—Properties of mixed, uncured methyl methacrylate binder

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
<th>Test method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viscosity</td>
<td>700 to 2500 cps</td>
<td>ASTM D445</td>
</tr>
<tr>
<td></td>
<td>(No. 3 at 20 rpm, Brookfield RVT)</td>
<td></td>
</tr>
</tbody>
</table>
Table 2.2.2b—Properties of methyl methacrylate high-friction surface treatment

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
<th>Test method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressive strength*</td>
<td>greater than 1.5 ksi (3 hours)</td>
<td>ASTM C579, Method B</td>
</tr>
<tr>
<td>Elongation</td>
<td>70 percent minimum</td>
<td>ASTM D638 Type 1</td>
</tr>
<tr>
<td>Thermal compatibility*</td>
<td>Pass</td>
<td>ASTM C884/C884M, Method B</td>
</tr>
</tbody>
</table>

*Samples should be made using 2.75 volume parts 20-30 sand per ASTM C778, No. 20 to No. 30 sieve to one volume part of mixed methyl methacrylate.

2.2.3 *Broadcast aggregate*—Unless otherwise specified aggregate shall be calcined bauxite meeting the requirements listed in Tables 2.2.3a and 2.2.3b. Aggregate shall have a hardness of 6 or greater on the Mohs hardness scale.

Table 2.2.3a—Properties of aggregate

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
<th>Test Method</th>
</tr>
</thead>
</table>

This draft is not final and is subject to revision. Do not circulate or publish: confidential.
<table>
<thead>
<tr>
<th>Aluminum Oxide Al₂O₃ content</th>
<th>87 percent minimum</th>
<th>ASTM C25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abrasion Resistance</td>
<td>5 percent loss maximum</td>
<td>ASTM D7428</td>
</tr>
<tr>
<td>Moisture content</td>
<td>0.2 percent maximum</td>
<td>ASTM C566</td>
</tr>
</tbody>
</table>

1

Table 2.2.3b—Broadcast aggregate gradation

<table>
<thead>
<tr>
<th>Mesh size</th>
<th>Percent passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 4</td>
<td>100</td>
</tr>
<tr>
<td>No. 8</td>
<td>30 to 75</td>
</tr>
<tr>
<td>No. 16</td>
<td>0 to 5</td>
</tr>
<tr>
<td>No. 30</td>
<td>0 to 1</td>
</tr>
</tbody>
</table>

3

PART 3—EXECUTION

3.1—Trial application

Unless otherwise specified, a successful high-friction surface treatment (HFST) trial section shall be installed and approved by the Architect/Engineer before starting HFST construction. The HFST trial section shall:

a) Be at least 20 ft long and equal to the production work width

b) Be constructed using the same equipment and method as the production work

c) Replicate field conditions, including ambient and surface temperatures (within ±15°F), anticipated for the production work

d) Demonstrate surface preparation requirements

e) Remove or protect (as specified) pavement markings and delineation within the area to receive HFST.
f) If automated equipment is proposed for use demonstrate binder component proportioning and mixing meet manufacturer recommendations

g) Verify the polymer binder application rate prior to aggregate placement and determine the gel time for polymer binder

h) Have temporary or permanent pavement markers and delineation in place when lanes are open to public traffic

i) Demonstrate binder is covered to excess with aggregate

j) Demonstrate loose aggregate can be removed

k) Demonstrate that work can be completed within the lane closure time permitted

l) Demonstrate HFST removal methods by removing part of the trial HFST and dispose of removed material.

m) Provide a minimum skid resistance (SN40S) of SN ≥ 70

n) Provide a tensile bond strength on concrete surfaces greater than or equal to 250 psi, on asphalt surfaces greater than or equal to 100 psi, or 100 percent substrate failure (ASTM C1583/C1583M)

o) An acceptable trial section that is placed on a location designated for an HFST may remain in place.

Do not begin HFST production work until successful completion of the trial HFST and authorization is provided by the Architect/Engineer.

3.2—Manufacturers representative

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Unless otherwise specified, a manufacturer’s representative shall be present at the construction site to train construction personnel prior to placing the HFST and shall remain on the project for the first two days of placement.

3.3—Surface preparation

3.3.1 Surfaces to which high-friction surface treatment (HFST) are to be applied shall be clean, dry, and free of all dust, oil, debris, and any other material that might interfere with the bond between the binder material and existing surfaces. Adequate cleaning of all surfaces will be determined by the manufacturer’s representative and approved by the Architect/Engineer. Utilities, drainage structures, curbs and any other structure within or adjacent to the treatment location shall be protected from the application of the HFST materials. Cover and protect all existing pavement markings that are adjacent to the application as directed by the Architect/Engineer. Pavement markings specified to be removed shall be removed by mechanical means and the surface shall be swept clean prior to the binder application.

3.3.2 For applications on new asphalt, a mandatory 30-day cure period shall take place prior to the installation of the HFST binder and broadcast aggregate. Clean new and existing asphalt surfaces by use of mechanical vacuum sweepers or high-pressure air lance. Compressed air should be a minimum of 180 cfm. Maintain air lance at a slight angle to perpendicular to the surface and the tip of the air lance within 12 in. of the surface.

3.3.3 Clean concrete pavement surfaces by shot blasting to remove all curing compounds, loosely bonded mortar, surface carbonation, and deleterious material. The surface shall comply with ICRI 310.2R. After shot blasting, clean surfaces with a minimum of 180 cfm of clean and dry
compressed air to remove dust, debris, and deleterious material. Maintain air lance at a slight angle
to perpendicular to the surface and the tip of the air lance within 12 in. of the surface.

3.3.4 Apply test patches of the HFST to prepared concrete/asphalt surfaces at the rate of one
per every 4000 ft². Evaluate the test patches using the procedure described in ASTM
C1583/C1583M, except that the tensile bond evaluation shall not be performed at surface
temperatures above 80°F. An evaluation shall be the average of three individual tests at each test
patch location. Tensile bond strength of concrete surface shall have an average pull off strength of
greater than or equal to 250 psi (asphalt greater than or equal to 100 psi). For concrete and asphalt
surfaces, core drill through the test HFST patch to a depth of 0.5 in. (±0.125 in.) into the underlying
substrate. Tests should be repeated when results are not a failure of concrete substrate in 50 percent
or more of the test area, or 100 percent failure in asphalt substrates. If the test results do not meet
the required average pulloff strength, check the surface preparation procedures, modify, repeat the
surface preparation, and repeat the tests. If additional testing does not meet the strength
requirements, the Architect/Engineer shall make the decision on the placement of the HFST

3.4—High-friction surface treatment application

3.4.1 Unless otherwise specified, no visible moisture shall be present on the prepared substrate
surface at the time of high-friction surface treatment (HFST) application. Use a plastic sheet left
taped in place according to ASTM D4263 (modified to a minimum of 2 hours) to identify moisture
in the substrate.

3.4.2 Condition the binder components per the manufacturer recommendations.

3.4.3 Protect pavement markings from exposure to the HFST materials, unless otherwise
specified. For bridge applications, protect joints and drains.
3.4.3 Pretreat pavement joints and cracks greater than ¼ in. wide with the mixed binder specified. Once the binder in the pretreated areas has gelled, the HFST installation may proceed.

3.4.4 HSFT mixing and application may use automated and semi-automated methods.

3.4.4.1 Automated application method shall consist of equipment that continuously meters, mixes, and applies the binder and aggregate in a continuous operation. The binder applicator vehicle shall use continuous pumping and proportioning devices that mix the binder within a controlled sealed system with the capability to supply printed binder component usage. The binder shall be mixed in a ratio per the manufacturer’s specification and shall be continuously applied once blended. The application vehicle should be able to apply the binder at the application rates specified in Table 3.4.4.1. Binder component mixture ratios shall be verified when mixing is stopped for more than 1 minute. Aggregate shall be applied immediately after the binder is applied, so that no wet binder is visible.

3.4.4.2 Semi-automated application shall consist of continuous metering and mixing equipment within a controlled system with the capability to supply printed binder component usage. The mixed binder should be continuously applied to the substrate and uniformly spread at the application rates specified in Table 3.4.4.1, with notched squeegees. Binder component mixture ratios shall be verified when mixing is stopped for more than 1 minute. Aggregate shall be applied immediately following binder application onto the substrate. Aggregate may be applied by mechanical or pneumatic equipment or by hand. Aggregate shall be applied such that no wet binder is visible.

3.4.5 HFST binder application rates will vary based on substrate surface texture. Application rate shall meet the requirements listed in Table 3.4.4.1.
Table 3.4.4.1—High-friction surface treatment binder application rate

<table>
<thead>
<tr>
<th>Macro-texture depth, in. (ASTM E965)</th>
<th>Maximum binder application rate, sq ft/gal.</th>
</tr>
</thead>
<tbody>
<tr>
<td>less than 0.04</td>
<td>32</td>
</tr>
<tr>
<td>0.04 to 0.06</td>
<td>21</td>
</tr>
<tr>
<td>greater than 0.06</td>
<td>Two applications at 32 each</td>
</tr>
</tbody>
</table>

3.4.6 Removal of excess aggregate can be started once the HFST has cured sufficiently that the aggregate will not be dislodged during removal process. Removal of excess aggregate shall be done with street sweeping equipment. Unless otherwise specified, removed aggregate shall not be reused.

3.4.7 Allow the HFST to cure in accordance with the manufacturer recommendations prior to opening to traffic.

3.4.8 All areas of travel lanes and shoulders shall be reswept 24 to 36 hours after opening to traffic to remove any aggregate shedding, unless otherwise specified.

3.5—Field quality control

3.5.1 The contractor quality control manager shall be on the jobsite at all times during placement of the HFST. Any deviation from the approved quality control plan shall be cause for immediate suspension of operations.

3.5.2 Tensile bond tests shall be performed on the cured HFST and shall meet the requirements of 3.3.4. The failure mode shall be cohesive within the concrete or asphalt substrate. There should be no adhesion failures at the HFST substrate bond line.

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3.5.3 Skid resistance testing shall be performed on the HFST in accordance with ASTM E274/E274M and result in average skid resistance readings of greater than or equal to 70 unless otherwise specified. Skid resistance testing shall be conducted 30 days after the HFST installation is completed.

3.6—Cleanup

3.6.1 Protect concrete surfaces against spillage beyond the limits of surface receiving coating.

3.6.2 Immediately remove any epoxy resin applied or spilled beyond desired areas. Perform cleanup with material designated by epoxy coating manufacturer. Avoid contamination of work area.

3.6.3 Contractor shall remove and dispose of all components of the high-friction surface treatment (HFST), including excess broadcast aggregate. Disposal shall be in accordance with binder and aggregate manufacturers recommendations and local regulations.

NOTES TO SPECIFIER

General notes

G1. ACI Specification 548.Y-19 is to be used by reference or incorporation in its entirety in the Project Specification. Do not copy individual Sections, Parts, Articles, or Paragraphs into the Project Specification, because taking them out of context may change their meaning.

G2. If Sections or Parts of ACI Specification 548.Y-19 are copied into the Project Specification or any other document, do not refer to them as an ACI Specification, because the specification has been altered.
A statement such as the following will serve to make ACI Specification 548.Y-19 a part of the Project Specification:

“Work on (Project Title) shall conform to all requirements of ACI 548.Y-19, ‘Specification for Producing a Skid-Resistant Surface on Concrete by the Use of a Epoxy and Aggregate,’ published by the American Concrete Institute, Farmington Hills, Michigan, except as modified by these Contract Documents.”

Each technical Section of ACI Specification 548.Y-19 is written in three-part Section format of the Construction Specifications Institute, as adapted for ACI requirements. Language is imperative and terse.

ACI Specification 548.Y-19 is written to the Contractor. When a provision of this Specification requires action by the Contractor, the verb “shall” is used. If the Contractor is allowed to exercise an option when limited alternatives are available, phrasing “either...or...” is used. Statements provided in the Specification as information to the Contractor use verbs “may” or “will.” Informational statements typically identify activities or options that “will be taken” or “may be taken” by the Owner or Architect/Engineer.

FOREWORD TO CHECKLISTS

This Foreword is included for explanatory purposes only; it is not a part of ACI Specification 548.Y-19.

ACI Specification 548.Y-19 may be referenced by the Specifier in the Project Specification for any building project, together with supplementary requirements for the specific project. Responsibilities for project participants must be defined in the Project Specification. ACI

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Specification 548.Y-19 cannot and does not address responsibilities for any project participant other than the Contractor.


**F4.** The Mandatory Requirements Checklist indicates work requirements regarding specific qualities, procedures, materials, and performance criteria that are not defined in ACI Specification 548.Y-19. The Specifier must include these requirements in the Project Specification.

**F5.** The Optional Requirements Checklist identifies Specifier choices and alternatives. The Checklist identifies the Sections, Parts, and Articles of the ACI Reference Specification 548.Y-19 and the action required or available to the Specifier. The Specifier should review each of the items in the Checklist and make adjustments to the needs of a particular project by including those selected alternatives as mandatory requirements in the Project Specification.

**F6.** The Submittals Checklist identifies information or data to be provided by the Contractor before, during, or after construction.

**F7.** Recommended references—Documents and publications that are referenced in the Checklists of ACI Specification 548.Y-19 are listed in the following. These references provide guidance to the Specifier and are not considered to be part of ACI Specification 548.Y-19.

### MANDATORY REQUIREMENTS CHECKLIST

<table>
<thead>
<tr>
<th>Section/Part/Article</th>
<th>Notes to Specifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5.1</td>
<td>Specify submittal distribution and approval procedures.</td>
</tr>
</tbody>
</table>

### OPTIONAL REQUIREMENTS CHECKLIST

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<table>
<thead>
<tr>
<th>Section/Part/Article</th>
<th>Notes to Specifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2.3</td>
<td>Calcined bauxite is the specified aggregate; however, the designer may specify other types of aggregate so long as they meet the requirements for moisture content, hardness, and gradation as called for in Tables 2.2.3a and 2.2.3b and are angular and nonfriable. Such alternative aggregates may include silica sand, basalt, and flint.</td>
</tr>
<tr>
<td>3.1</td>
<td>Some small projects may not be large enough to require a trial application.</td>
</tr>
<tr>
<td>3.2</td>
<td>Manufacturer’s representative may be required to remain on site for the duration of a project or until the Architect/Engineer deems that the contractor is sufficiently trained in the proper installation procedures.</td>
</tr>
<tr>
<td>3.3.4</td>
<td>Depending on the conditions or requirements of the project where performance will not be adversely affected, the engineer of record may allow the project to proceed when values. Do not meet the minimum specified.</td>
</tr>
<tr>
<td>3.4.1</td>
<td>Binder manufacturers product may not be moisture sensitive and can be used with a maximum level of substrate moisture. Allowable substrate moisture content should be approved by the Architect/Engineer and the binder manufacturer.</td>
</tr>
<tr>
<td>3.4.3</td>
<td>Project may require that the HFST be installed over the area of pavements markings. If this is the case, existing pavement markings may be required to be removed and replaced after the HFST installation.</td>
</tr>
<tr>
<td>3.4.5</td>
<td>The application thickness of the binder should be sufficient to allow the broadcast aggregate to imbed at least 50 percent of the aggregate dimension. The surface texture may require the application rate to be different from that specified in Table 3.4.4.1 to assure proper aggregate embedment.</td>
</tr>
</tbody>
</table>
3.4.6 Removed and reclaimed broadcast aggregate that is not contaminated with binder or foreign substances may be allowed to be blended with new aggregate and reused with the approval of the Architect/Engineer and binder manufacturer.

3.5.3 Architect/Engineer should specify friction values required if different that the specified value based on project requirements.

## SUBMITTALS CHECKLIST

<table>
<thead>
<tr>
<th>Section/Part/Article</th>
<th>Submittal items and notes to Specifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5.1.a</td>
<td>Manufacturer’s certification</td>
</tr>
<tr>
<td>1.5.1.b</td>
<td>Materials technical data sheets</td>
</tr>
<tr>
<td>1.5.1.c</td>
<td>Safety data sheets</td>
</tr>
<tr>
<td>3.3.2 &amp; 3.3.3</td>
<td>Surface preparation procedures and equipment</td>
</tr>
<tr>
<td>3.3.4</td>
<td>Request acceptance of pulloff strength less than 250 psi</td>
</tr>
<tr>
<td>3.4</td>
<td>Mixing and application procedure</td>
</tr>
</tbody>
</table>