IN-LB Inch-Pound Units

An ACI Standard

Specification for Polished Concrete Slab Finishes

Reported by Joint ACI-ASCC Committee 310

ACI 310.1-20

AMERICAN SOCIETY OF CONCRETE CONTRACTORS
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Specification for Polished Concrete Slab Finishes

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This is a Reference Specification that the Architect/Engineer can apply to any construction project involving polished concrete slab finishes by citing it in the Project Specifications. A mandatory requirements checklist and an optional requirements checklist are provided to assist the Architect/Engineer in supplementing the provisions of this Specification as required or needed by designating or specifying individual project requirements.

The first section of this Specification covers general requirements for polished concrete slab finishes. The second section covers requirements for products and equipment, and the third section covers construction requirements. Provisions governing testing, evaluation, and acceptance of polished concrete slab finishes are included. This Specification for polished concrete slab finishes is applicable to both slabs-on-ground and suspended slabs.

Keywords: abrasive tooling; distinctness of image (DOI); edge polishing; grinding; haze; honing; mockup; polished concrete; polishing process; slab finish; specular gloss; surface defects.

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ACI 310.1-20 was adopted August 15, 2020, and published November 2020.

PART 1—GENERAL

1.1—Scope

1.1.1 This Specification covers construction of polished concrete slab finishes.

1.1.2 This Specification is incorporated by Contract Documents and provides requirements for Contractor.

1.1.3 This Specification governs for construction within its scope, except project-specific Contract Documents govern if there is a conflict.

1.1.4 *Work not specified*—The following Work is not in the scope of this Specification:

(a) Construction of cast-in-place concrete slab

1.1.5 This Specification governs if there is a conflict with materials and testing standards referenced in this Specification.

1.1.6 Contractor is permitted to submit written alternatives to any provisions in this Specification. Alternates must be approved in writing by Architect/Engineer or Owner's Representative, or both.

1.1.7 Provisions of this Specification that are not applicable to the Work are not valid.

1.1.8 *Units*—Values in this Specification are stated in inch-pound units. A companion specification in SI units is available.

1.1.9 Unless otherwise stated, the inch-pound system of units shall be applicable in ASTM standards referenced in this Specification.

1.1.10 The Notes to Specifiers are not part of this Specification.

1.2—Interpretation

1.2.1 Unless otherwise explicitly stated, this Specification shall be interpreted using the following principles:

1.2.1.1 Interpret this Specification consistent with the plain meaning of the words and terms used.

1.2.1.2 Definitions provided in this Specification govern over the definitions of the same or similar words or terms found elsewhere.

1.2.1.3 Whenever possible, interpret this Specification so that its provisions are in harmony and do not conflict.

1.2.1.4 Headings are part of this Specification and are intended to identify the scope of the provisions or sections that follow. If there is a difference in meaning or implication between the text of a provision and a heading, the meaning of the text governs.

1.2.1.5 Where a provision of this Specification involves two or more items, conditions, requirements, or events connected by the conjunctions "and" or "or," interpret the conjunction as follows:

1.2.1.5(a) "And" indicates that all the connected items, conditions, requirements, or events apply.

1.2.1.5(b) "Or" indicates that the connected items, conditions, requirements, or events apply singularly.

1.2.1.6 The use of the verbs "may" or "will" indicates that the Specification provision is for information to Contractor.

1.2.1.7 The phrase "as indicated in Contract Documents" means the specifier included the provision requirements in Contract Documents.

1.2.1.8 The phrase "unless otherwise specified" means the specifier may have included an alternative to the default requirement in Contract Documents.

1.2.1.9 The phrase "if specified" means the specifier may have included a requirement in Contract Documents for which there is no default requirement in this Specification.

1.3—Definitions

Please refer to the latest version of ACI Concrete Terminology for a comprehensive list of definitions. Definitions provided herein complement that resource.

abrasive impregnated pad—a pad, resembling a typical floor maintenance burnishing pad, that can contain industrial-grade diamonds and has the capability of refining the concrete surface on a microscopic level.

abrasive tooling—tooling that contains industrial grade abrasives within a bonded matrix (such as metallic, resinous, ceramic) that are attached to rotating heads to refine the concrete substrate.

accepted—determined by Architect/Engineer to be in compliance with Contract Documents.

aggregate exposure—grinding a concrete floor surface with bonded abrasives to achieve a specified class of exposed aggregate.

aggregate exposure class—the surface exposure after grinding and polishing operations based on visual observation of the overall area of the polished floor.

aggregate pop-outs—where either the coarse or fine aggregate becomes dislodged from the matrix of the concrete.

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

Construction Documents—written and graphic documents and specifications prepared or assembled for describing the location, design, materials, and physical characteristics of the elements of a project necessary for obtaining a building permit and construction of the project.

Contract Documents—set of documents that form the basis of a contractual relationship between the 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 the construction of the Work.

crack—separation of concrete into two or more parts produced by breaking or fracturing.

Distinctness of image (DOI)—a quantification of the deviation of the direction of light propagation from the regular direction by scattering during transmission or reflection.

Drawings—graphic presentations that detail requirements for Work and may include written notes.

edge polishing—steps required to polish concrete substrate along a vertical abutment to provide an appearance similar to that installed within the open areas of the room.

gloss-enhancing treatment—water, or solvent based, film-forming materials that penetrate or adhere to polished and densified concrete surfaces leaving a clear, durable, high gloss finish.

grinding—process achieved by using coarse abrasives to remove surface of the slab without creating a uniform finish.

honing—a process achieved by using bonded abrasive tooling to give surface a smooth, matte finish.

Inspection Agency—the person, firm, or entity under contract for providing inspection services.

joint filler—two-component, 100% solids, semi-rigid polyurea or epoxy.

mockup—sample of the completed polished Work that is reviewed and approved to be the accepted level of craftsmanship.

Mohs Hardness Scale—scale used to measure the relative hardness of a mineral by its resistance to scratching.

Owner—the corporation, association, partnership, individual, public body, or authority for whom the Work is constructed.

pinhole—a very small circular surface opening.

polishing—the use of bonded abrasive tooling to give the surface a smooth finish that meets the measurable specified aesthetic requirements. The higher sheen is achieved by using incrementally finer abrasives in the course of the polishing process.

polishing process—steps required by Contractor to transform concrete substrate into a specified finished gloss. These steps may include a sequence of grits of bonded abrasives spanning the grinding, honing, and polishing stages.

scratches—scratches in the slab surface that occur prior to or during concrete polishing process.

slab protrusions—items that extend above the surface of the slab such as abandoned anchor bolts.

spall—fragment, usually in the shape of a flake, detached from a larger mass.

specialty engineer—an individual representing Contractor who is licensed to practice engineering as defined by the statutory requirements of the professional licensing laws of the state or jurisdiction in which the project is to be constructed.

Specifications—the written document that details requirements for Work.

submit—provide to Architect/Engineer for review.

submittal—document or material provided to Architect/Engineer for review and acceptance.

stain prevention film—removable product designed to create barrier on floor surface to prevent staining or shadowing of surface from joint filler overfill or repair material overfill, or both.

stain-resistant, gloss-enhancing treatment—water-based, film-forming material that penetrates polished and densified concrete surfaces leaving a clear, durable, high-gloss, and stain-resistant surface finish.

surface defects—aggregate pop-outs, spalls, cracks, pin holes, slab protrusions, scratches, and surface pitting.

surface pitting—irregular surface cavities.

Testing Agency—the person, firm, or entity under contract for providing testing services.

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

1.4—Referenced standards

1.4.1 Standards referred to in this Specification are listed with serial designation including year of adoption or revision.

1.4.1.1 *ASTM International standards*

ASTM D523-14—Standard Test Method for Specular Gloss

ASTM D638-14—Standard Test Method for Tensile Properties of Plastics

ASTM D2240-15e1—Standard Test Method for Rubber Property—Durometer Hardness

ASTM D4039-09 (2015)—Standard Test Method for Reflection Haze of High-Gloss Surfaces

ASTM E1155-14—Standard Test Method for Determining F_F Floor Flatness and F_L Floor Levelness Numbers

ASTM D5767-17—Standard Test Method for Instrumental Measurement of Distinctness-of-Image (DOI) Gloss of Coated Surfaces

1.5—Submittals

1.5.1 *General*—Provide submittals as indicated in Contract Documents. No Work shall be performed relating to a submittal until the submittal is approved by Architect/Engineer in writing.

1.5.2 *Substitution*—Submit substitution requests that specifically identify proposed substitution and demonstrate compliance with performance requirements in accordance with Contract Documents.

1.5.3 *Contractor's quality control plan*—If required, submit a quality control plan showing means, methods, products and equipment to be used to obtain the specified polished slab finish. Provide information related to quality control in accordance with 1.7.1.

Specify if Contractor is required to submit quality control plan.

1.5.4 *Product data*—Submit manufacturer's technical literature for each product specified or proposed. Include manufacturer's technical data, application instructions, and recommendations.

1.5.5 *Installer qualifications*—Submit data for company, personnel, experience, and training to conform to 1.5.5.1 through 1.5.5.3:

1.5.5.1 List of five projects performed over the last 3 years of similar type, size, and complexity.

1.5.5.2 Certification of installer's training from manufacturer of each product.

1.5.5.3 Unless otherwise specified, submit verification that a competent supervisor who is at the Project during the specified Work is certified as a Concrete Polishing Council (CPC) Craftsman, or equivalent.

Specify if more or fewer certified concrete polishers are required or permitted. Concrete polishers should be certified on the basis of work experience or successful completion of a certification program that includes written and performance examinations as described in ASCC CPC Certification Policies, February 19.

1.5.6 *Polishing Schedule*—Submit plan showing polished concrete slab finishes and schedule of polishing operations for each area of polished concrete before start of polishing operations. Include locations of all joints, including construction joints. Schedule to include details of sequencing Work with respect to coordination of other trades interior construction, final weather protection, and when protection is necessary, if other construction activities could damage the in-place polished Work.

1.5.7 *Repair data*—Submit manufacturer's technical literature for each repair product specified or proposed. Include manufacturer's technical data, application instructions, and recommendations.

1.5.7.1 *Surface defect repairs*—Submit plan locating and identifying surface defects. Reference surface defect locations to building column lines.

1.5.7.2 *Crack repair*—Unless otherwise specified, submit plan locating and identifying concrete cracks. Reference crack locations to building column lines.

Consider eliminating this provision if there are no cracks, if the cracks are not detrimental to polishing, or if the cracks will not be repaired.

1.6—Testing and inspection

1.6.1 *Quality assurance: Duties and responsibilities of Owner's Testing Agency*

1.6.1.1 Unless otherwise specified, the Owner's Testing Agency will provide the services when the polished Work exceeds 5000 ft^2. Provide services specified in 1.6.1.1(a) through 1.6.1.1(c).

1.6.1.1(a) Owner's Testing Agency will inspect, sample, and test materials for conformance to requirements in Contract Documents. If material furnished or Work performed by Contractor fails to conform to Contract Documents, testing agency will report deficiency to Architect/Engineer, Owner, Contractor, and other relevant parties.

1.6.1.1(b) Owner's Testing Agency and its representatives are not authorized to revoke, alter, relax, enlarge, or release requirements in Contract Documents, or to accept or reject portions of Work.

1.6.1.1(c) Owner's Testing Agency will report test and inspection results of Work to Owner, Architect/Engineer, and Contractor and other relevant parties within 7 days after tests and inspections are performed.

1.6.1.2 *Testing services*—If required by Owner or Architect/Engineer, Owner's Testing Agency will perform testing services given in 1.6.2.2(a) through 1.6.2.3. (b) at no cost to Contractor.

1.6.1.2(a) Test specular gloss in accordance with ASTM D523, Distinctness of Image (DOI) in accordance with ASTM D5767, and haze in accordance with ASTM D4039 for compliance with Contract Documents at least 2 weeks prior to Owner's possession.

1.6.1.2(b) Other testing or inspection services as required by Architect/Engineer.

1.6.1.3 *Testing frequency*—If required by Owner or Architect/Engineer, Owner's Testing Agency will perform testing frequency given in 1.6.1.3(a) through 1.6.2.3(c)

1.6.1.3(a) Specular gloss shall be measured at three locations for areas up to 1000 ft^2 with one additional test for each 1000 ft^2 or fraction thereof. The tests shall be selected randomly in each test area and the test areas shall be distributed across the entire polished floor.

1.6.1.3(b) Distinctness of Image (DOI) shall be measured at three locations for areas up to 1000 ft^2 with one additional test for each 1000 ft^2 or fraction thereof. The tests shall be selected randomly in each test area and the test areas shall be distributed across the entire polished floor.

1.6.1.3(c) Haze shall be measured at three locations for areas up to 1000 ft^2 with one additional test for each 1000 ft^2 or fraction thereof. The tests shall be selected randomly in each test area and the test areas shall be distributed across the entire polished floor.

1.7—Quality control

1.7.1 *Duties and responsibilities*—Unless otherwise specified, Contractor assumes duties and responsibilities specified in 1.7.1.1 through 1.7.1.4.

1.7.1.1 Confirm proposed materials meet requirements in Contract Documents.

1.7.1.2 Confirm that the concrete surface profile tolerances are adequate to achieve the specified aggregate exposure level.

1.7.1.3 Allow Owner's Testing Agency access to project site.

1.7.1.4 Advise Owner's Testing Agency at least 24 hours in advance of operations that require services specified in 1.6.1.2(a) through 1.6.1.2(b) to allow for scheduling of quality assurance tests, review of project requirements, and assignment of personnel.

1.7.1.5 Submit information documenting compliance of materials with contract requirements.

1.8—Quality assurance

1.8.1 *Polisher qualifications*— Owner's Representative to ensure that all contractors on site meet the qualification requirements outlined in 1.5 Submittals.

1.8.2 *Preconstruction conference*—If specified, schedule and attend preconstruction conference with Architect/Engineer, Owner and/or Owner's Representative and any other interested parties to review project requirements, acceptance criteria and responsibilities.

Specify if a preconstruction meeting is required, and if so, who should be notified, and length of notice required before conference.

1.8.2.1 *Conference notification*—Advise Architect/Engineer, Contractor, Owner or Owner's representative at least 7 days in advance of conference.

1.8.2.2 *Conference report*—Record discussions, including decisions and agreements reached, and furnish copy of record to each party attending within 7 days, but before the placement of slabs that will be polished.

1.8.3 *Field mockup*—Before performing Work of this Section, provide field mockup to verify selections made under submittals and to demonstrate aesthetic effects of polishing in accordance with 1.8.3.1 through 1.8.3.7. Approval does not constitute approval of deviations from Contract Documents unless Architect/Engineer specifically approves deviations in writing.

1.8.3.1 Unless otherwise specified, construct field mockups using same procedures, equipment, and materials that will be used for production of polished concrete. Accepted field mockup will serve as a reference to which polished concrete will be compared for periodic and final acceptance. Construct field mockups at an acceptable location on site. Provide a simulated repair to demonstrate acceptable procedures. Repair procedures will provide an acceptable color and texture match. Protect from physical damage and retain mockups until final acceptance of polished concrete.

1.8.3.2 Concrete in mockup area to have a minimum cure of 28 days.

1.8.3.3 Prior to starting mockup installation, verify surface hardness with a Mohs Hardness testing kit.

1.8.3.4 Mockup shall include slab edge polishing Work. Mockup area shall also include completed joint filling and shall demonstrate the polishing processing over one or more floor joints.

1.8.3.5 Provide preconditioned (previously used) bonded abrasives, having a complete range of tooling available for a variety of concrete surface hardnesses.

1.8.3.6 The mockup shall be reviewed and approved by Architect/Engineer or Owner's representative or both and shall become the minimum standard for acceptance of the polished Work.

1.8.3.7 Concrete polishing Work shall not begin until mockup has been reviewed and accepted by Owner's Representative in writing.

1.9—Acceptance of polished slab finish

1.9.1 *General*—Completed concrete polishing Work shall conform to applicable requirements of this Specification and Contract Documents.

1.9.1.1 Concrete polishing Work that fails to meet one or more requirements in Contract Documents but subsequently is repaired to bring the polished concrete slab finish into compliance will be accepted.

1.9.1.2 Concrete polishing Work that fails to meet one or more requirements in Contract Documents and cannot be brought into compliance is subject to rejection.

1.9.1.3 Submit proposed repair methods, materials, and modifications needed to repair concrete polishing Work to meet requirements in Contract Documents.

1.9.1.4 Repair concrete polishing Work as necessary to in compliance with requirements in Contract Documents.

1.9.2 *Polished slab finishes*

1.9.2.1 *General*—Completed concrete polished slab finishes shall be accepted if they meet the following requirements:

1.9.2.1(a) Work is comparable to the accepted mockup as determined by Architect/Engineer.

1.9.2.1(b) The average of measured Distinctness of Image (DOI) for the Work shall meet that specified in 3.4.4.

1.9.2.1(c) The average of measured specular gloss for the Work shall meet that specified in 3.4.5.

1.9.2.1(d) The average of measured haze index for the Work shall meet that specified in 3.4.6.

1.9.3 *Periodic acceptance*

1.9.3.1(a) Architect/Engineer will periodically observe completed portions of polished concrete for conformance with accepted field mockup. The frequency of periodic acceptance and acceptance criteria will be established at preconstruction conference

1.9.3.1(b) Polished concrete declared unacceptable during periodic observation shall be repaired or replaced. Submit a revised method of producing acceptable concrete before proceeding with additional architectural concrete construction.

1.10—Protection of polished slab finish

1.10.1 Protect completed polished concrete slab finish from damage until Substantial Completion. Protection shall include the following:

1.10.1.1 Prohibit vehicle and pedestrian traffic on unprotected polished concrete slab.

1.10.1.2 Prohibit stocking construction materials, storing equipment, or tools on unprotected polished concrete slab.

1.10.1.3 Prohibit parking vehicles on unprotected polished concrete slab.

1.10.1.4 If construction equipment must be used on the polished concrete slab, use non-marring tires and diaper components that might drip oil, hydraulic fluid, or other liquids.

1.10.1.5 Prohibit tire embedments (rocks, nails, screws) that will scratch or pit polished concrete slab.

1.10.1.6 Regular inspections for tire embedment's and leaks shall be conducted to avoid damage to the polished concrete slab.

1.10.1.7 Prohibit pipe cutting or threading using machinery on polished concrete slab.

1.10.1.8 Control food and drink that can stain or damage unprotected polished concrete slab.

1.10.1.9 Prohibit temporary placement or storage of steel on polished concrete slab.

1.10.1.10 Prevent acids and acidic detergents from contacting polished concrete slab.

1.10.1.11 Cover polished concrete slab with breathable drop cloths during painting. If paint is spilled on concrete floor, remove paint promptly.

1.10.1.12 Protect polished concrete slab from standing moisture for 72 hours after completion to prevent re-emulsification of surface treatment(s) prior to cure.

1.10.1.13 Promptly remove mortar splatter, spilled liquids, oil, grease, paint, coatings, and other surface contaminants that adversely affect completed polished concrete slab finish. Clean up using soap, water, and rinse method.

1.10.1.14 Maintain liquid barrier at sill plates and floor penetrations to protect both polished concrete slab and adjacent floors from liquid intrusion.

PART 2—PRODUCTS AND EQUIPMENT

2.1 Products

2.1.1 *General*—No Work shall be performed relating to a submittal until the submittal is approved by Architect/Engineer in writing.

2.1.2 *Surface defect repair materials*

2.1.2.1 *Pinhole, surface pitting, aggregate popouts, and scratches*—Unless otherwise specified, repair materials shall conform to 2.1.2.1(a) through 2.1.2.1(d).

2.1.2.1(a) Resinous, latex, reactive, epoxy, urethane, or cementitious repair material that shall be color coordinated to specified floor color and can be polished.

2.1.2.1(b) Repair grouting material shall become incorporated by concrete floor matrix and shall not degrade under routine scrubbing operations.

2.1.2.1(c) Repair grouting material shall enhance specular gloss and Distinctness of Image (DOI) of concrete and mask surface defects in finished floor.

2.1.2.1(d) Repair grouting material shall have sufficient bonding capabilities to adhere after the polishing to the concrete surface and shall provide abrasion resistance equal to or greater than the surrounding concrete substrate.

2.1.2.2 *Crack repair*—Unless otherwise specified, repair materials shall conform to 2.1.2.2(a).

2.1.2.2(a) Two-component semi-rigid or rigid polyurea or epoxy that approximates specified color and can be polished.

2.1.2.3 *Spall repair*—Unless otherwise specified, repair materials shall conform to 2.1.2.3(a) through 2.1.2.3(c).

2.1.2.3(a) Install two-component polyurea or epoxy that approximates specified color and can be polished.

2.1.2.3(b) Add fine or coarse aggregate to spall repair material when required to approximate slab finish appearance.

2.1.2.3(c) Grind finished spall repair flush to concrete floor surface.

2.1.3 *Reactive surface densifier*

2.1.3.1 Unless otherwise specified, provide a densifier that reacts chemically with available calcium hydroxide, a by-product of cement hydration, at the concrete surface.

2.1.4 *Surface treatments*

2.1.4.1 If specified, provide gloss-enhancing and stain-resistant treatment that conforms to 2.1.4.1(a) through 2.1.4.1(c).

2.1.4.1(a) *Gloss-enhancing treatment*—Water- or solvent-based, film-forming material that penetrates or adheres to polished and densified concrete surfaces while increasing gloss values.

2.1.4.1(b) *Stain-resistant, gloss-enhancing treatment*—Water- or solvent-based, film-forming material that penetrates or adheres to polished and densified concrete surfaces while providing improved stain resistance and increasing gloss values.

2.1.4.1(c) *Penetrating protective treatment*—Non-film-forming, water- or solvent-based material that penetrates polished and densified concrete surfaces while providing improved stain resistance.

2.1.5 *Penetrating surface colorant materials*

2.1.5.1 Unless otherwise specified, provide a surface colorant material that conforms to 2.1.5.1(a) or 2.1.5.1(b).

2.1.5.1(a) *Dye*—Non-film forming, soluble colorant dissolved in a carrier designed to fully penetrate and alter color and appearance of a concrete floor surface without a chemical reaction.

2.1.5.1(b) *Chemical stain*—Reactive solution of water or acid, and inorganic salts that react with minerals in the concrete to provide the specified floor color.

2.1.6 *Joint filler*

2.1.6.1 Unless otherwise specified, joint filler shall conform to 2.1.6.1(a) through 2.1.6.1(c)

2.1.6.1(a) Two-component, 100 percent solids, semi-rigid polyurea or epoxy that closely approximates specified color and can be polished.

2.1.6.1(b) Shore Hardness of the joint filler shall be dictated by floor use:

2.1.6.1(b1) *Pedestrian traffic*—Minimum Shore A Hardness of 60 when measured in accordance with ASTM D2240 and an elongation above 25 percent when measured in accordance with ASTM D638.

2.1.6.1(b2) *Hard-wheeled traffic*—Minimum Shore A Hardness of 80 when measured in accordance with ASTM D2240 and an elongation above 25 percent when measured in accordance with ASTM D638.

2.1.6.1(c) Use a stain prevention film or alternate stain prevention method, if needed, to prevent staining or shadowing on slab surface from joint filler overfill.

2.2—Equipment

2.2.1 *Field grinding and polishing equipment*

2.2.1.1 Walk-behind or ride-on equipment with multiple balanced, planetary, same direction or counter- rotating heads designed for grinding and polishing.

2.2.1.2 Equipment shall have at least one of the following methods for controlling dust:

2.2.1.2(a) Integrated water delivery system that continuously feeds water to the grinding surface.

2.2.1.2(b) Port for connection to a dust collection system appropriately sized for the dust generated. Dust collection system conforms to 2.2.4.

2.2.2 *Edge grinding and polishing equipment*

2.2.2.1 Stand-up or hand-held edger capable of producing the similar grinding and polishing results as field grinding

and polishing equipment. Equipment shall be designed to be used within 1/4 in. of vertical surfaces.

2.2.2.2 Handheld grinders shall be equipped with shroud and dust collection system. Dust collection system shall conform to 2.2.4.

2.2.3 *High-speed burnishing equipment*

2.2.3.1 Walk-behind or ride-on equipment with a variable-speed, single or multiple rotating head that spins an abrasive impregnated pad, with or without bonded abrasives. The equipment shall have a dust collection system that conforms to 2.2.4. or shall contain an integrated water control system.

2.2.4 *Dust collection system*

2.2.4.1 Unless otherwise specified, use vacuum system with HEPA filtration that attaches to polishing equipment that is capable of limiting dust that shall comply with the respirable crystalline silica exposure limits defined in current OSHA Standard.

2.2.5 Abrasive tooling

2.2.5.1 Unless otherwise specified, provide abrasive tooling that conforms to 2.2.5.1(a) through 2.2.5.1(c)

2.2.5.1(a) Metal bonded abrasive tooling

2.2.5.1(b) Resin bonded abrasive tooling

2.2.5.1(c) Hybrid bonded abrasive tooling

2.2.6 *Abrasive maintenance/burnishing pads*

2.2.6.1 Abrasive impregnated pads shall be suitable for use during the installation and/or maintenance of polished concrete flooring, and/or the restoration of previously installed polished concrete slab finish.

PART 3—EXECUTION

3.1—Examination

3.1.1 *Acceptance of surfaces and conditions*

3.1.1.1 Examine substrates to be polished for compliance with requirements in 3.1.1.1(a) through 3.1.1.1(j).

3.1.1.1(a) Confirm that the concrete slab surface was cured in accordance with Contract Documents.

3.1.1.1(b) Confirm that the specified surface flatness and levelness requirements, when the concrete slab was placed and finished, are in accordance with ASTM E1155 and Contract Documents.

3.1.1.1(c) Confirm concrete compressive strengths are in accordance with Contract Documents.

3.1.1.1(d) Confirm ambient and surface temperatures to be in accordance with manufacturer's requirements for all products for Work.

3.1.1.1(e) Confirm that Owner's testing agency results for Mohs Hardness test are in accordance with this Specification.

3.1.1.1(f) Confirm that Owner's testing agency results for floor flatness and levelness measured prior to polishing are appropriate for the specified polished slab finish.

3.1.1.1(g) Examine floor to receive polished concrete slab finish for any deficiencies that prevents achieving a polished concrete slab finish in accordance with Contract Documents. These deficiencies include but are not limited to: curling, stains, cracking, trowel marks, or surface defects that adversely affect achieving the specified polished slab finish.

3.1.1.1(h) Notify Architect/Engineer or Owner's representative, or both, in writing of any conditions prior to polishing that would adversely affect the appearance of polished concrete slab.

3.1.1.1(i) Do not begin Work until unsatisfactory conditions are corrected in a manner complying with Contract Documents or until a remediation plan is approved in writing by Architect/Engineer or Owner's representative or both.

3.1.1.1(j) Starting Work within any area will be construed as acceptance of surface conditions.

3.1.2 *Site conditions*

3.1.2(a) Examine the substrates and conditions that may affect the performance of the Work. Do not begin work until the substrates and conditions are in accordance to Contract Documents.

3.1.2(b) Verify that the building shell is sufficiently complete to keep out wind, rain, snow, and other adverse weather affects that could damage the polishing Work.

3.1.2(c) Do not begin Work until suitable water, power, lighting, and ventilation are provided.

3.1.2(d) Do not begin Work until the slab is at a minimum temperature of 50°F and provisions are in place to maintain the slab temperature at 50°F.

3.1.2(e) Do not begin Work until a minimum lighting of 40 ft candles measured at the slab surface has been provided.

3.1.2(f) Do not begin Work until the area is clean with minimal construction materials and debris.

3.1.3 *Surface preparation*

3.1.3.1 *Protection*—Protect surrounding surfaces that could be damaged during surface preparation.

3.1.3.2 *Clean surfaces*—Provide sound concrete by preparing and cleaning concrete surfaces to remove laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, paint splatter, and other contaminants incompatible with liquid-applied products and polishing Work.

3.1.4 *Test requirements prior to polishing Work*

3.1.4.1 Confirm Mohs Hardness measured on slab surface is greater than 4.

3.2—Surface finish requirements

3.2.1 *General*—Work shall meet the requirements as specified in 3.2.2 through 3.2.7.

3.2.2 *Color*—Provide added color system to the polished slab finish for each portion of the Work as indicated in Contract Documents.

3.2.3 *Aggregate exposure*—Provide aggregate exposure class of the polished slab finish for each portion of the Work as indicated in Contract Documents.

3.2.3.1 The class of aggregate exposure shall meet the requirements of Table 3.2.3.1 and in conformance with approved mockup(s).

3.2.4 *Appearance*—Provide the level of Distinctness of Image (DOI) gloss of the polished slab finish for each portion of the Work as indicated in Contract Documents.

3.2.4.1 The level of DOI shall meet the requirements of Table 3.2.4.1 and be in conformance with approved mockup(s).

Table 3.2.3.1—Aggregate exposure for each class

Class	Name	Surface exposure
A	Cement fines	85 to 95 percent cement fines 5 to 15 percent sand aggregate
B	Sand aggregate	85 to 95 percent sand aggregate 5 to 15 percent blend of cement fines and coarse aggregate
C	Coarse aggregate	80 to 90 percent coarse aggregate 10 to 20 percent blend of cement fines and sand aggregate

Table 3.2.4.1—Appearance levels for distinctness of image (DOI)

Level	Name	Appearance	DOI value, percent
1	Flat (ground)	Images of objects being reflected have a flat appearance	0 to 9
2	Satin (honed)	Images of objects being reflected have a matte appearance	10 to 39
3	Polished	Images of objects being reflected do not have a sharp and crisp appearance but can be easily identified	40 to 69
4	Highly polished	Images of objects being reflected have a sharp and crisp appearance as would be seen in a near-mirror like reflection	70 to 100

3.2.5 *Specular gloss*—If required, provide the specular gloss of the polished slab finish for each portion of the Work as indicated in contract documents.

3.2.5.1 The specular gloss shall be measured prior to the application of a protectant and in conformance with approved mockup(s).

3.2.6 *Haze*—Unless otherwise specified, the haze index shall be less than 12 and in conformance with approved mockup(s).

3.2.7 *Unspecified polished slab finish*—If slab finish is not specified, provide the following finish:

3.2.7.1 *Color*—No color.

3.2.7.2 *Aggregate exposure*—Class B.

3.2.7.3 *Appearance*—Level 3.

3.2.7.4 *Haze*—Less than 12.

3.3—Coloring for polished concrete slab finish

3.3.1 *Color*—If required, provide the color of the polished slab finish for each portion of the Work as indicated in Contract Documents.

3.3.2 *Dye or pigmented microstain application*

3.3.2.1 Unless otherwise specified, the color application shall be installed in accordance with 3.3.2.1(a) through 3.3.2.1(d).

3.3.2.1(a) Apply solution by methods and techniques required by manufacturer to produce finish matching approved mockup.

3.3.2.1(b) Maintain wet edge, working newly applied solution into edges of adjacent wet edges of previously treated surfaces.

3.3.2.1(c) Maintain consistent saturation throughout application.

3.3.2.1(d) Avoid splashing, dripping, or puddling of solution on adjacent substrates.

3.4—Grinding and polishing

3.4.1 *General*—Grinding and polishing shall proceed in same manner used to achieve approved mockup.

3.4.1.1 Begin initial grinding using sufficient sized equipment and abrasive tooling to meet specified aggregate exposure class.

3.4.1.2 Make sequential grinding passes with each pass perpendicular to previous pass.

3.4.1.3 Overlap adjacent grinding passes to achieve even aggregate exposure without creating striping.

3.4.1.4 Progressively grind edges to match field (main) surface area.

3.4.1.5 Clean surface thoroughly between grit levels.

3.4.1.6 Thoroughly scrub and rinse slab surface with clean water and cleaning surfactant to lift any surface salts and laitance and vacuum up with auto scrubber between grinding passes. Dispose of waste solution in compliance with all local, state, and federal guidelines and regulations for disposal.

3.4.2 *Treating surface defects*—If surface defects are observed during initial grinding, follow the requirements in 2.1.2.

3.4.2.1 If using a non-resinous grouting system, mix approved surface-defect repair material with dust created by grinding operations, manufacturer's tint, or sand to match color of adjacent concrete surfaces.

3.4.2.2 Fill surface defects with approved repair material to eliminate pitting in finished Work in conformance with approved mockup(s).

3.4.3 *Reactive surface densifier application*

3.4.3.1 Ensure slab surface is clean, dry, and water-absorbent at time of application of densifier.

3.4.3.2 Apply densifier to point of surface saturation in accordance with manufacturer's recommendations.

3.4.3.3 Apply reactive surface densifier in accordance with manufacturer's instructions, ensuring that application is applied to point of rejection. Continue progressively polishing with appropriate resin tooling.

3.4.4 *Honing*

3.4.4.1 Progressively hone edges along walls and around all abutments.

3.4.4.2 Progressively hone slab with 100-, 200-, 400-, hybrid, or resin bonded tooling.

3.4.4.3 Sequential progression of bonded abrasive tooling shall be required and shall be limited to no more than double the grit value of the previous tooling used.

3.4.4.4 Between honing passes, thoroughly scrub and rinse slab surface with clean water and vacuum up with auto scrubber.

3.4.4.5 Perform each honing pass perpendicular to the previous pass.

3.4.5 *Polishing*

3.4.5.1 Progressively polish edges along walls and around all abutments.

3.4.5.2 Progressively polish slab with resin bonded tooling.

3.4.5.3 Tooling shall be used, in a sequential progression, to achieve surface refinement for each grit.

3.4.5.4 Between polishing passes, thoroughly scrub and rinse slab surface with clean water and vacuum up with auto scrubber.

3.4.5.5 Perform each polishing pass perpendicular to the previous pass.

3.4.6 *Surface treatment*

3.4.6.1 If specified, apply approved surface treatment product in accordance with manufacturer's published instructions.

3.4.6.2 Apply approved product using manufacturer's recommended sprayer and tip. Ensure sprayer tip is clean and in good working condition for each day's Work.

3.4.6.3 Use new applicator pad for each coat, pre-wetted with surface treatment product, to pull material out to create a thin film prior to drying.

3.4.6.4 Remove product completely from areas of over-application, as evidenced by surface streaking, and replace with unused surface treatment product.

3.4.7 *High-speed burnish*

3.4.7.1 Burnish surface per manufacturer's instructions and when surface treatment product application has had the proper dry time.

3.4.7.1(a) Burnish at a slow movement pace using high speed machine with abrasive impregnated or natural hair burnishing pads.

3.4.7.1(b) Burnish with several passes. Make each progressive pass perpendicular to previous pass.

3.4.7.2 Continue burnishing operations to achieve specified specular gloss and DOI levels.

3.5—Repair

3.5.1 *General repair requirements*

3.5.1.1 Repair areas of Work that are not accepted by the Architect/Engineer in accordance with the requirements in 2.1.2.

3.5.1.2 Use repair products and equipment as indicated in the Contract Documents and in accordance with the manufacturer's instructions to match the approved mockup.

NOTES TO SPECIFIER

General notes

G1. ACI-ASCC Specification 310.1 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-ASCC Specification 310.1 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.

G3. A statement such as the following will serve to make ACI-ASCC Specification 310.1 a part of the Project Specification:

> "Work on (Project Title) shall conform to all requirements of ACI-ASCC Specification 310.1, 'Specification for Polished Concrete Slab Finishes' published by the American Concrete Institute, Farmington Hills, Michigan, except as modified by these Contract Documents."

G4. Each technical section of ACI-ASCC Specification 310.1 is written in the three-part section format of the Construction Specifications Institute, as adapted for ACI requirements. The language is imperative and terse.

G5. If ACI-ASCC Specification 310.1 is referenced in Contract Documents along with another ACI specification that contains overlapping provisions, identify which requirements are in conflict and state in Contract Documents which requirements govern.

Foreword to checklists

F1. This foreword is included for explanatory purposes only; it is not a part of ACI-ASCC Specification 310.1.

F2. ACI-ASCC Specification 310.1 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-ASCC Specification 310.1 cannot and does not address responsibilities for any project participant other than Contractor.

F3. Checklists do not form a part of ACI-ASCC Specification 310.1. Checklists assist the specifier in selecting and specifying project requirements in the Project Specification.

F4. The Mandatory Requirements Checklist indicates work requirements regarding specific qualities, procedures, materials, and performance criteria that are not defined in ACI-ASCC Specification 310.1. The specifier must include these requirements in the Project Specification.

F5. The Optional Requirements Checklist identifies specifier alternatives or additions. The checklist identifies the sections, parts, and articles of ACI-ASCC Specification 310.1, and the action required or available to the specifier. The specifier should review each of the items in the checklist and adjust the needs of a project by including those selected alternatives or additions as mandatory requirements in the Project Specification.

F6. *Cited references*—Documents and publications that are referenced in the checklists of ACI-ASCC Specification 310.1 are listed below. These references provide guidance to the specifier and are not considered to be part of ACI-ASCC Specification 310.1.

ACI 301-16—Specification for Concrete

ACI 310R-13—Guide to Decorative Concrete

Bartz, D.; Harrison, P.; and Suprenant, B., 2016, "Uniform Polished Concrete Starts with the Canvas: Proven techniques to avoid Problems," *Concrete Contractor*, Aug.-Sept., pp. 32-38.

Concrete Polishing Council (CPC), "Glossary Terms," American Society of Concrete Contractors (ASCC), https://www.ascconline.org/concrete-polishing-council/glossary.

Scharich, T.; Gill, C.; Lloyd, S.; Harrison, P.; and Suprenant, B., 2016, "Specifying the Concrete Slab to be Polished," *The Construction Specifier*, Aug., pp. 34-44.

MANDATORY REQUIREMENTS CHECKLIST

Section/Part/ Article	Notes to Specifier
General	
1.5.1	Indicate required submittals.
1.8.3.1	Specify location of mockups.
Execution	
3.2.2	Specify color of polished slab finish for each portion of Work.
3.2.3	Specify Class A, B or C for aggregate exposure of polished slab finish in accordance with Table 3.2.3.1 for each portion of the Work.
3.2.4	Specify Level 1, 2, 3 or 4 DOI gloss of polished slab finish in accordance with Table 3.2.4.1 for each portion of Work. Choosing level 4 is likely to require grouting of the surface, which increases the cost of the polished Work.
3.2.5	If required, specifier shall define the specular gloss of polished slab finish for each portion of Work.
3.3.1	Indicate the color for each portion of the Work.

OPTIONAL REQUIREMENTS CHECKLIST

Section/Part/ Article	Notes to Specifier
General	
1.1.1	Specifier can find information on the construction of polished concrete slabs in ACI-ASCC 310R.
1.1.4	ACI 301 can be used to specify construction of cast-in-place concrete slabs. Guidance for modifying that Specification for concrete slabs to be polished can be found in Bartz et. al. (2016) and Scharich et. al. (2016).
1.5.3	Specify if Contractor is required to submit quality control plan.
1.5.5.3	Specify if more or fewer certified concrete polishers are required or permitted. Concrete polishers should be certified on the basis of work experience or successful completion of a certification program that includes written and performance examinations as described in ASCC CPC Certification Policies, February 19.
1.5.7.2	Consider eliminating this provision if there are no cracks, if the cracks are not detrimental to polishing, or if the cracks will not be repaired.
1.6.1.1	Indicate who shall perform testing services if under 5000 ft^2; otherwise, no testing services will be performed.
1.6.1.2	Specify additional or delete services as necessary.
1.6.1.3	Specify additional or delete testing frequency as necessary.
1.7.1	Specify additional or delete duties and responsibilities as necessary.
1.8.1	Specify additional or delete requirements as necessary.
1.8.2	Specify if a preconstruction meeting is required, and if so, who should be notified and the length of notice required before conference.
1.8.3.1	Specify if mockup can be part of the completed Work.
Products and equipment	
2.1.2.1	Alternatively, Specifier may list products or a specific product.
2.1.2.2	Alternatively, Specifier may list products or a specific product.
2.1.2.3	Alternatively, Specifier may list products or a specific product.
2.1.3.1	Alternatively, Specifier may list products or a specific product.
2.1.4.1	Alternatively, Specifier may list products or a specific product.
2.1.5.1	Alternatively, Specifier may list products or a specific product.
2.1.6.1	Alternatively, Specifier may list products or a specific product (that is, flexible sealant above isolation joint materials after polishing is complete).
2.2.4.1	Alternatively, Specifier may provide other requirements.
2.2.5.1	Alternatively, Specifier may provide other requirements.
Execution	
3.2.6	Alternatively, specify a different haze index.
3.4.6.1	Specify if a surface treatment is required.

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As ACI begins its second century of advancing concrete knowledge, its original chartered purpose remains "to provide a comradeship in finding the best ways to do concrete work of all kinds and in spreading knowledge." In keeping with this purpose, ACI supports the following activities:

- Technical committees that produce consensus reports, guides, specifications, and codes.
- Spring and fall conventions to facilitate the work of its committees.
- Educational seminars that disseminate reliable information on concrete.
- Certification programs for personnel employed within the concrete industry.
- Student programs such as scholarships, internships, and competitions.
- Sponsoring and co-sponsoring international conferences and symposia.
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The American Concrete Institute (ACI) is a leading authority and resource worldwide for the development and distribution of consensus-based standards and technical resources, educational programs, and certifications for individuals and organizations involved in concrete design, construction, and materials, who share a commitment to pursuing the best use of concrete.

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