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Important Definitions

Throughout this document, the terms “shall,” “should,” and “recommend” are used to compare and contrast the different levels of importance attached to certain practices and procedures.

It is impractical to prescribe procedures intended to apply to every hard surface floor covering inspection situation. In certain circumstances, deviation from portions of this Standard may be appropriate. Carelessness is unacceptable and common sense and professional judgment are to be exercised in all cases.

shall: when the term shall is used in this document, it means that the practice or procedure is mandatory due to natural law or regulatory requirement, including occupational, public health, and other relevant laws, rules, or regulations, and is therefore a component of the accepted “standard of care” to be followed.

should: when the term should is used in this document, it means that the practice or procedure is a component of the accepted “standard of care” to be followed, while not mandatory by regulatory requirements.

recommend(ed): when the term recommend(ed) is used in this document, it means that the practice or procedure is advised or suggested but is not a component of the accepted “standard of care” to be followed.

In addition, the terms “may” and “can” are also available to describe referenced practices or procedures, and are defined as follows:

may: when the term may is used in this document, it signifies permission expressed by the document, and means that a referenced practice or procedure is permissible within the limits of this document, but is not a component of the accepted “standard of care” to be followed.

can: when the term can is used in this document, it signifies an ability or possibility open to a user of the document, and it means that a referenced practice or procedure is possible or capable of application but is not a component of the accepted “standard of care” to be followed.

For the practical purposes of this document, it was deemed appropriate to highlight and distinguish the critical hard surface floor covering inspection methods and procedures, from the less critical, by characterizing the former as the perceived and recommended “standard of care”. The IICRC S220 Consensus Body interprets the “standard of care” to be practices that are common to reasonably prudent members of the trade who are recognized in the industry as qualified and competent. Notwithstanding the foregoing, this Standard is not intended to be either exhaustive or inclusive of all pertinent requirements, methods, or procedures that might be appropriate on a particular hard surface floor covering inspection project. Ultimately, it is the responsibility of the inspector to verify on a case-by-case basis that application of this Standard is appropriate.
Section A  Scope, Purpose, and Application

A.1  Scope

This standard describes the procedures, methods, and systems for professional inspectors to follow when inspecting light commercial and residential hard surface floor coverings; including stone, laminate, prefinished wood, ceramic, and resilient.

This Standard does not specifically address the protocols and procedures for installing hard surface floor coverings. Users of this standard should refer to Section B: References of this document for additional information.

A.2  Purpose

The purpose of this standard is to define basic procedures, and techniques for evaluating hard surface types, characteristics and conditions, in order to determine appropriate procedures for inspecting hard surface floor coverings. It was not written to teach inspection procedures. It was not written with destructive testing taken into account. Numerous manuals, videotapes, workshops, and seminars are available to teach comprehensive hard surface floor covering inspection procedures.

Every floor installation has unique characteristics that should be evaluated to determine which inspection procedures are applicable. Since every claim that initiates the need for inspection services is unique, in certain circumstances, common sense, experience and professional judgment may justify a deviation from this Standard.

A.3  Application

This standard was created for use by professional inspectors, flooring manufacturers, product suppliers, building contractors, architects, specifiers, designers, distributors, flooring retailers, end-users, facility managers, institutions, and others involved in the hard surface floor covering industry.
Section B  References

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ANSI A108.02 General Requirements; Materials, Environmental, and Workmanship 2017; American National Standards Specifications for Ceramic Tile; American National Standards Institute, Inc; Tile Council of North America, Inc., www.tcnatile.com

ANSI A108.10 Installation of Grout in Tilework 2017; American National Standards Specifications for Ceramic Tile; American National Standards Institute, Inc; Tile Council of North America, Inc.,
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Section C  Definitions

above-grade: above the surface of the ground, as related to floor location.
adhered: secured and supported by adhesion of an approved bonding material over an approved backing.
ambient lighting: light that is already present in an area, before any additional/supplemental lighting is added. It usually refers to natural light, either outdoors or coming through windows etc.
ASTM International: American Society for Testing and Materials International. A consensus standard setting organization with voluntary members representing a broad spectrum of individuals, agencies and industries who are concerned with development of test standards for a variety of materials. ASTM is a resource for sampling and testing methods, health and safety of materials, safe performance guidelines, and effects of physical and biological agents and chemicals.
below-grade: below the surface of the ground, as related to floor location, part or all of the floor is below the ground.
bond: the adherence of one material to another.
contaminant: a deleterious substance that can prevent a proper bond.
core: in laminated flooring, the core provides for strength and impact resistance and can be made from high or medium-density fiberboard, particle (chipboard, or polyurethane foam. Particleboard and fiberboard are produced from compressed wood fibers mixed with bonding agents and is vulnerable to moisture.
crowning: a “convex” or “crowned” condition or appearance where the center of individual strips becomes higher than the edges. This can also be a type of warp.
cupping: a concave or dished appearance of individual boards with the edges of the board raised higher than the center. This is also a type of warp.
cushioned vinyl: any vinyl sheet floor covering incorporating a foam layer as part of its construction.
decorative layer: the rotogravure printing process offers a multitude of design possibilities that are expressed through the decorative layer such as patterns, geometrics, natural stone designs and more.
deflection: a variation in position or shape of a structure or structural element due to effects of loads or volume change, usually measured as a linear deviation from an established plane rather than an angular variation.
delamination: the separation of layers in laminated wood or plywood caused by failure of the adhesive itself or of the interface between adhesive and adherend.
embossed: a decoration in relief or excised on the wear surface.
embossed in register: a manufacturing process that intensifies the depth, texture and realistic look of the floor by aligning the embossing with the printed design.
fiberglass core sheet vinyl: a type of heterogeneous sheet vinyl that is cushioned and contains a fiberglass core layer.
**finish**: process applied to the exposed surfaces of dimension stone during fabrication to achieve the desired aesthetic and/or performance characteristics of the stone. The finish may be applied early or late in the fabrication sequence.

**hardwood**: commonly one of the botanical groups of deciduous trees that have broad leaves in contrast to the conifers or softwoods. This term does not refer to the actual hardness of the wood.

**heterogeneous resilient flooring**: a resilient floor surfacing material consisting of layers of dissimilar compositions or colors, or both.

**high-pressure laminate flooring**: a product created by permanently bonding high-pressure decorative laminate to a core.

**homogeneous vinyl flooring**: a floor surfacing material in sheet or tile form that is of uniform structure and composition throughout. It usually consists of vinyl plastic resins, plasticizers, fillers, pigments and stabilizers.

**linoleum**: a floor surfacing material composed of oxidized linseed oil, mixed with cork or wood flour, mineral filler and pigments and bonded to a jute or suitable backing. Can be produced with or without a high performance, permanently bonded coating that improves the floor’s resistance to damage and makes cleaning easier.

**luxury vinyl tile (LVT)**: a type of flexible, vinyl floor tile and/or plank that has a beautiful printed design protected by a durable urethane wear layer. LVT products are easy to install, but they do require full spread adhesive and the proper sized trowel for installation.

**moisture content**: the amount of moisture expressed as a percentage of the weight of the oven dry wood.

**moisture meter**: a tool used to measure moisture content.

**open time**: amount of time recommended for the adhesive to remain exposed to the air following application, prior to the placement of the flooring material.

**oriented strand board**: a particle panel composed of strand-type flakes with purposefully aligned directions which make a panel stronger, stiffer, and with improved dimensional properties in the alignment directions than a panel composed of random flake orientation.

**plank**: solid boards that are usually thicker than ¾” and 3” to 8” wide.

**relative humidity**: the ratio of the amount of water vapor present in the air to that which the air would hold at saturation at the same temperature. Usually expressed as a percent.

**resilient flooring**: an organic floor surfacing material made in sheet or tile form or formed in place as a seamless material of which the wearing surface is non-textile. The resilient floor covering classification by common usage includes, but is not limited to asphalt, cork, linoleum, rubber, vinyl, vinyl composition, and polymeric poured seamless floors. Resilient in this sense is used as a commonly accepted term but does not necessarily define a physical property.

**solid vinyl tile**: a resilient tile flooring composed of binder, fillers and pigments compounded with suitable stabilizers and processing aids. The tile meets requirements of ASTM Specification F 1700. The binder consists of polymers and/or copolymers of vinyl chloride, other modifying resins, and plasticizers which comprise at least 34% by weight of the finished tile. The polymers and copolymers of vinyl chloride comprise at least 60% of the weight of the binder.
supplementary lighting: lighting used to provide an additional quantity and quality of illumination, not obtained by the general lighting system; usually provides for specific work requirements.

underlayment: an underlayment is a layer of material that gets placed over the subfloor/substrate prior to the installation of the finished flooring in order to accomplish a specified purpose.

wearlayer (Wear Layer): in laminated flooring the wearlayer usually consist of multiple layers of kraft paper that has been impregnated with phenolic resins and pressed together under high heat and pressure. This is the HPL (high-pressure lamination) process, the first step of the CPL (continuous pressure lamination) process, the second being the attachment of the wearlayer and backer layer to the core. The bottom layer of kraft paper is imprinted with a photograph that provides the floors pattern or design.

working time: the maximum amount of time that an adhesive can remain exposed and still effectively bond to the flooring.
BSR/IICRC S220 Standard

1 Professional Hard Surface Floor Covering Inspector

The hard surface floor covering category includes a wide range of materials that vary by manufacturing techniques, composition, construction, installation, and maintenance requirements.

Due to interrelated industry complexities, it is inevitable that concerns from retailers, flooring installers and end users will arise, which creates the need for specially trained inspectors who have knowledge of all areas of the hard surface floor covering industry. Inspectors should employ practical field testing and scientific methodologies in investigating, documenting and arriving at accurate and unbiased conclusions of concerns. The inspection is complete when a conclusion is reached. Only when specifically asked by the commissioning party can an inspector consult regarding potential resolutions of the concern(s).

1.1 Independent Inspections vs. Evaluations

There are a variety of floor covering professionals who evaluate claims. They typically fall into one of three primary groups:

1.1.1 Initial Evaluation

Commissioners and end-users have historically relied on the expertise of long-term and experienced specifiers, retailers and installers to view obvious defects and claims. Their primary objective is to find a resolution, or document the concern, and initiate a formal claim.

1.1.2 Manufacturer Evaluation

Manufacturer evaluations can be performed by an employee or manufacturer’s representative. Their primary objective is to document the concern, determine the cause, and when possible, find a resolution to the concern. When there is no agreement on a resolution, an independent inspector may be commissioned.

1.1.3 Certified Independent Inspectors

Certified independent inspectors should be independent, and their inspections should be free from influence that might be perceived by end-users to be biased toward a manufacturer, retailer or installer.

A certified inspector should complete recognized industry training, have passed written exams and have met specific criteria set by an industry recognized hard surface floor covering inspection certification body.

1.2 Inspector Responsibilities

Professional hard surface floor covering inspectors should serve as the eyes and ears of the commissioning party in the field and should be able to communicate their findings in writing. They should approach each claim objectively in order to arrive at unbiased conclusions. Their inspection process should include, but not be limited to:

- observation;
- collection of facts and samples;
- photo documentation;
Inspection reports are the exclusive property of the commissioning party. Inspectors should be able to respond to questions regarding their report and explain and support their documentation and conclusions if questioned by the commissioning party or other materially interested parties. For example, if the commissioning party is the manufacturer and the claim report is conveyed by the commissioner to other materially interested parties, and the report is questioned, with the commissioner’s written permission, the inspector may answer questions.

Inspectors should be realistic regarding their capabilities and limitations. They should seek assistance from industry specialists when claim issues exceed their core competencies.
2 Commissioning Parties

2.1 Definition of Commissioning Party

A commissioning party is the entity who contracts for the services of the flooring inspector. There are many types of commissioners who may need the services of a professional inspector.

The commissioning party may have various reasons for commissioning an inspection with the primary reason being the resolution of a concern.

2.2 Qualifying Inspectors

Commissioning parties should take reasonable steps to determine whether an inspector’s qualifications are appropriate for a particular concern. Commissioning parties may ask the inspector for evidence of current certification, relevant experience regarding the concern requiring inspection, references, and proof of general liability insurance.

2.3 General Guidelines

General guidelines set forth in this standard should be used in tandem with guidelines provided by the party commissioning the inspection.

2.3.1 Understanding the Commission

An inspector’s primary objective is to collect information and answer a commissioning party’s questions. It is not the inspector’s responsibility to resolve the claim. Only when specifically asked by the commissioning party can an inspector provide consultation regarding potential resolutions of the concern(s).

Commissioning parties should be specific about what areas or concerns are to be inspected. The inspector should address concerns related to the scope specified on the request; however, if other concerns on the same material are brought to the attention of the inspector, the inspector should consult the commissioning party as to how to address the additional concerns. Commissioning parties should expect an inspector’s conclusions to be based on and supported with facts gathered during the inspection process.

The inspector should discuss the scope of the inspection with the commissioning parties as well as the fees for inspection services. If services beyond a basic inspection are to be provided (e.g., adding fees for testing, correcting, instructing, or travel) then the fees for such extra services should be agreed upon prior to the extra service being performed.

2.3.2 Conducting the Inspection

Inspectors should understand expectations set by the commissioning parties regarding promptness in contacting end-users and in preparing inspection reports. Inspectors should communicate expectations to the commissioning party related to the submittal of inspection reports. Inspectors should conduct themselves as professionals, and all actions should be performed in an ethical manner and without conflict of interest. If a known conflict of interest arises or is anticipated, the inspector should disclose that conflict to the commissioning party or decline the inspection.

2.3.3 The Report

Inspection reports should be computer-generated and not handwritten. Proper grammar and sentence structure should be used to enhance the professionalism and readability of reports. Some commissioning parties require that reports be completed online using proprietary software. Inspectors should not draw
conclusions, make statements, or state opinions that are not supported by evidence presented within their reports.

The inspection report belongs to the commissioning party who should decide to whom the report is to be distributed.

2.3.4 Broker Inspection Services

It is not uncommon for the commissioning party to contract an inspector broker service to hire a local inspector to conduct the inspection and write the report. The inspection broker should never change or modify an inspector’s report without the authorization of the inspector. If an inspector is asked to modify a report and agrees with the changes, a new report should be provided by the inspector. If the inspector does not agree to the suggested changes or modifications, the original inspection report should be submitted to the commissioning party to ensure the integrity of the inspection.
3 Writing Inspection Reports

Inspection reports should be concise, factual, accurate, unbiased, and grammatically correct to enable commissioners to envision what the inspector sees in the field. A well-written inspection report should walk the commissioning party through the inspection process, providing a clear understanding of the concerns observed during the inspection process. Reports should be prepared in a manner that would withstand potential litigation.

Carefully written and proof-read inspection reports are an essential component of the inspection process. Inspectors should exercise care and attention to detail when compiling reports for the commissioning party with the understanding that the report may be made available to any materially affected party.

3.1 Written report requirements

All inspection reports should be computer generated using word processing programs. All reports should be subjected to spelling and grammar checks.

The written report should provide a format to document all appropriate information relating to the inspection, as well as a general outline for a report narrative. The inspector can produce and submit a proprietary report. In some cases, a standardized report form may be provided by the commissioning party.

3.2 Documentation

3.2.1 Notes

It is recommended inspectors document information (i.e., notes) as soon as the claimant begins discussing events leading up to the request for inspection, answering questions, and providing a chronological history of the claim. It is recommended that documentation continue with recording data from field tests. Inspectors should be aware that field notes are subject to discovery in litigation.

3.2.2 Diagrams

Diagrams may be included to document location of areas of concern as relates to entries, windows, light sources, proximity to furnishings, fixtures, or traffic areas. Diagrams should be included when requested by the commissioning party.

3.2.3 Photography

Refer to Section 5: Photography for more information.

3.3 Report Writing Sequence

A report should be divided into two general sections. First a section, which should include but is not limited to:

- claim numbers;
- date of commission requests and date of inspection;
- commissioning parties;
- claimant information;
- retailer information;
1. product information (i.e., construction, color, type, underlayment);
2. date, areas and type of installation;
3. reason for the inspection;
4. maintenance and cleaning details, and
5. inspector administrative information.

The second section of the form should be a report narrative, in which details of the inspection are described. The claim narrative should follow a sequential format or progression of the onsite inspection process, followed by a conclusion.

3.3.1 Claim History

Claim history documentation should try to include the sequence of events leading up to the claim from applicable materially interested parties (e.g., retailer, installer, end user).

Claim history documentation should include the following:

- approximate date of installation;
- date concern(s) observed;
- when the concern was reported, and to whom;
- change of condition (progressing or improved);
- repair attempts and procedures, and
- maintenance procedures.

3.3.2 Site Description

Inspectors should describe the physical site to provide perspective for the commissioning party regarding site-specific conditions that could impact the claim being evaluated.

3.3.3 Inspector Observations

The inspector’s observations should identify the concerns and describe them using industry-accepted terminology. Inspectors should:

- evaluate and document the concern, installation methods and materials;
- to the best of their ability, confirm the product being inspected is same as the product in the commissioning party’s request (e.g., invoice, bill of sale, warranty information, attic stock);
- document observations with photographs to support findings;
- include a designation of specific rooms or areas in which the concern is located, and
- list physical conditions (e.g., lighting, furnishings, fixtures) that enhance or diminish the appearance of the concern.

3.3.4 Reporting Field or Laboratory Test Results

When field testing is performed by the inspector, it is recommended the inspector include:

- the number of tests;
- the location of test;
- the test apparatus used;
- the test results;
- the test protocol to which the test was performed to, and
- photo documentation of field test.
Any results of laboratory testing made available to the inspector should be attached to the report in its entirety.

### 3.3.5 Conclusions and Documentation

An inspector’s conclusions should state determination of cause of the concern and be supported by one or more of the following:

- data collection;
- field and/or laboratory testing;
- photographic documentation;
- manufacturer recommendations/instructions, and
- industry standards.

Sometimes a conclusion cannot be determined from the data collected. In this case, the inspector can recommend what further steps may be taken (e.g., laboratory or destructive testing).

Inspectors should not discuss details with anyone other than the commissioning party until the final report is completed and submitted. Reports are the property of the commissioning party. If the report or the inspector’s findings are requested from anyone other than the commissioning party, those inquiries should be referred to the commissioning party.
4 Inspection Tools and Equipment

This document is not designed to be a training manual. Inspectors should have the appropriate tools, equipment, and be trained in their use to perform inspections.

4.1 Inspecting Hardwood Flooring

It is recommended that the wood flooring inspector have the following tools and equipment (included but not be limited to):

- moisture meters;
  - invasive moisture meters, insulated pin or hammer probes;
  - non-invasive meters for wood and concrete;
- thermo-hygrometer;
- digital camera;
- small marking devices to point out affected locations in photographs;
- rare earth magnets;
- flashlight;
- magnification device;
- tape measure with inches and millimeters;
- machinist ruler;
- calipers, digital;
- 6' and/or 10' straight edge, dry line (string), laser level;
- pH test strips, distilled water, clean, white towel;
- blue painters’ tape;
- surface temperature reader;
- feeler gauge;
- taper gauge;
- thin pry bar/molding lifter;
- expansion detection tool (paperclip, dental pick);
- knife (utility), pliers, awl;
- knee pads, and
- batteries.

Inspectors should follow the manufacturer’s instructions and label directions for safe use of tools.

4.2 Inspecting Laminate Flooring

It is recommended that the laminate flooring inspector have the following tools and equipment (including but not limited to):

- moisture meters, non-invasive meters for wood and concrete;
- thermo-hygrometer;
- digital camera;
- small marking devices to point out affected locations in photographs;
- rare earth magnets;
- flashlight;
- magnification device;
- tape measure with inches and millimeters;
- machinist ruler;
- calipers, digital;
- 6’ and/or 10’ straight edge, dry line (string), laser level
- pH test strips, distilled water, clean, white towel;
Inspectors should follow the manufacturer’s instructions and label directions for safe use of tools.

4.3 Inspecting Resilient Flooring

It is recommended that the resilient flooring inspector have the following tools and equipment (included but not be limited to):

- thermo-Hygrometer;
- digital camera;
- small marking devices to point out affected locations in photographs;
- rare earth magnets;
- flashlight;
- magnification device;
- tape measure with inches and millimeters;
- calipers, digital;
- 6’ and/or 10’ straight edge, dry line (string), laser level;
- pH test strips, distilled water, clean, white towel;
- blue painters’ tape;
- surface temperature reader;
- feeler gauge;
- taper gauge;
- suction cup;
- thin pry bar/molding lifter;
- expansion detection tool (paperclip, dental pick);
- knife (utility), pliers, awl;
- knee pads, and
- batteries.

Inspectors should follow the manufacturer’s instructions and label directions for safe use of tools.

4.4 Inspecting Ceramic and Stone Floor Covering

It is recommended that the ceramic and stone flooring inspector have the following tools and equipment (including but not be limited to):

- thermo-hygrometer;
- digital camera;
- small marking devices to point out affected locations in photographs;
- flashlight;
- magnification device;
- depth gauge;
- tape measure with inches and millimeters;
- calipers, digital;
- 6’ and/or 10’ straight edge, dry line (string), laser level;
- pH test strips, distilled water, clean, white towel;
- blue painters’ tape;
- surface temperature reader;
- feeler gauge;
- speed square;
- taper gauge;
- sounding tool;
- tile puck;
- thin pry bar/molding lifter;
- expansion detection tool (paperclip, dental pick);
- knife (utility), pliers, awl;
- knee pads, and
- batteries.

Inspectors should follow the manufacturer's instructions and label directions for safe use of tools.

4.5 Photographic Equipment and Accessories

Inspectors should have photographic equipment and accessories that are needed to adequately document a concern. This could include video recording in certain instances.

Refer to Section 5: Photography in the standard for further details and specific information on proper usage.
5 Photography

5.1 Photography of Inspections

The hard surface floor covering inspector should include photos of their observations related to their written report. The use of photographs should also serve as confirmation of what the inspector has observed during the inspection process. Inspectors should provide written captions to explain what each photograph illustrates.

5.2 Types of Cameras and Other Equipment

5.2.1 Digital Cameras

Cameras are available in a variety of sizes with a variety of different features. The inspector should determine which camera best suits the needs of their work. The inspector should be able to review a photograph in real time and immediately view the image to determine if it depicts the desired information. If it does not, the photograph can be retaken without having to return to the site.

5.2.2 Video Cameras

In situations where still photography cannot clearly document the end users concerns, video cameras should be used. Video cameras accurately document movement, range of motion and sounds related to the consumers concern. Should the use of video or audio equipment not be practical, viable or permitted on an inspection site, this should be documented in writing as a limitation. Refer to Section 11: Limitations, Complexities, Complications, and Conflicts (LCCC).

5.2.3 Specialty Cameras

5.2.3.1 Photographic Magnification

Photographic Magnification should be used for documentation of details that cannot be captured with the use of standard photography (e.g., broken finish, presence of micro scratches, microchips, seam weld, crazing, cracking, etc.) Magnification can be performed with the use of handheld loupes, camera lenses, and cameras designed specifically for that purpose. Minute detail can also be documented using portable electronic microscopes that connect to an external source capable of recording and storing data.

5.2.3.2 Infrared Cameras

Specialty infrared cameras can show information outside the ability of the human eye. These cameras can help identify areas of variances in temperature and moisture.

5.2.3.3 Additional Equipment

When a photograph is taken of a large area, items such as paper arrows, pens, releasable colored tape, or numbered cards can be used to help identify the location(s) of the concern. The inspector should consider whether the glossy or matte finish of their prop may enhance or diminish light reflection in the photograph. Different colored arrows or numbered cards can help differentiate between multiple locations.

Another common piece of supplemental equipment is a tripod to steady the camera.

The inspector should ensure their images are taken under adequate lighting conditions and if there is not adequate lighting, additional equipment may be used to ensure quality photos. The additional equipment used may include a common flashlight, a higher-powered inspection light and/or an ultra-violet light.
5.2.3.4 Computer Programs

Photo software can be used to sharpen the picture, adjust the color, change the dimensions of the photo, or to insert indicators like lines, arrows or circles into the photo to identify problem areas. Software enhancements should only be performed on copies of the original photos. The original photograph should not be altered.

5.3 Individual Claim Needs

5.3.1 Number of Photographs

The scope of the claim will determine the number of photographs needed. The inspector should take as many photos as are required to accurately document the condition(s). When the same situation occurs repeatedly in a claim, only a random sampling of the affected areas may be needed to document the situation. Singular situations may be better documented with photos from multiple angles, varying distances or multiple lighting conditions.

5.3.2 Room Scenes

Overview photos should be taken of each area the flooring material is installed. Photographs of individual rooms can provide a wealth of information about a concern including maintenance, general appearance, use and condition of the site. This would depend on the needs or requirements of the commissioning party. Refer to Section 11: on Limitations, Complexities, Complications and Conflicts (LCCC) for more information.

5.3.3 Perspective

Photographs offer perspective of the areas of concern and their relationship to the type of use, exposure, and how it relates to traffic patterns, furniture placement, windows, etc. The inspector should include a caption with an explanation to the cause and effect relationships between the flooring and site conditions.

The inspector should avoid photographing building occupants especially children. This also includes situations unbecoming to the consumer and unrelated to the claim.

5.3.4 Ambient and Supplementary Lighting

5.3.4.1 Ambient lighting

The inspection should be performed initially from a standing position and under ambient lighting.

5.3.4.2 Supplementary lighting

In the absence of sufficient ambient lighting, supplementary ordinary lighting should be used.

The inspector should use supplementary lighting as follows:

- lateral – when surface irregularities are more prominent;
- overhead – when color differences are more apparent;
- reflective – when variations in sheen are most visible, and
- subtle – when concern is more noticeable in low light conditions.

Note: Patterns or embossing variations can be found in any of the listed lighting conditions.

5.4 Photo documentation
All information pertinent to the inspection should be photo documented, if applicable and available, such as:

- exterior of building (e.g., downspouts grade, landscaping, irrigation, parking lot/sealers);
- overview of room the flooring is installed in; location of direct sunlight (windows/sliders);
- condition of substrate in adjacent rooms (e.g., substrate contaminants, adhesive residues, standing water);
- view of concern from a standing position;
- closeup of concern;
- concern under magnification;
- meter readings (e.g., moisture meters, pH, gloss, thermal hygrometers, infrared thermometers);
- test results/locations (e.g., expansion gap, fastener schedule, moisture, bond, ambient temperature, slab temperature);
- measurements (e.g., thickness, width, length, gap size);
- packaging of materials;
- batch codes or box end stamps;
- pictures of sundry materials (e.g., adhesives, patches, levelers);
- photo of run number or stamp on the back of the flooring product;
- tools and equipment (e.g., trowel notches, sponges, nailers, underlayment);
- climate controls (e.g., thermostat, humidifier, dehumidifier, HRV/ERV);
- cleaning solutions (e.g., chemical cleaners, labels and directions);
- cleaning equipment (e.g., mops, carpet cleaning machines, buffing machines, machine attachments [brushes, pads]);
- soiling at entryways, and
- walkout mats.
6 Chain of Custody, Storage and Handling

Chain of custody documentation gives the inspector the ability to give an accurate accounting in a court of law as to the manner in which evidence was acquired, maintained, transported, examined, etc. and by whom, when, where, and for what purpose. It should describe the process used by the inspector to account for the samples from the moment it reached his/her custody until resolution of the claim. The laboratory used for sample testing should have a written policy to address chain of custody. The inspector should be prepared to testify in court as to their portion of the chain of custody.

6.1 Chain of Custody Form

A Chain of Custody Form is a written record that should be made of the receipt or release of any samples and should include a detailed description of the submitted sample including dimensions, material, color, etc. The original Chain of Custody Form should be maintained by the inspector that generated it during their handling of the evidence. Any release of the material should have a copy attached that describes when that evidence is released to any materially invested party or testing facility.

Any test documentation should be kept, regardless of the results.

6.2 Sample Shipping

The sample should be shipped via a service that utilizes a reliable package tracking system (e.g., US Postal Service by Registered Mail). Samples should be packaged in order to ensure the integrity of the shipment.
Section 7  Wood Flooring Inspection

For a prefinished/factory finished hardwood inspection, the inspector should observe, collect, and document the following:

- if the wood floor is engineered, solid, or assembled solid;
- width of the board/plank;
- affected area of concern;
- approximate amount of installation affected (localized or widespread);
- if the condition is increasing in frequency or severity;
- substrate/subfloor type;
- grade level of substrate/subfloor;
- moisture testing of material and substrate/subfloor, if possible;
- relative humidity and temperature;
  - of installed space, and
  - of crawl space/basement.
- if crawl space;
  - is there ground cover (keep in mind that this product may be attached to the bottom of the support members);
  - distance from bottom of joist to ground;
  - evidence of water or moisture, and
  - ventilation vents;
- try to ascertain acclimation of product, and
- describe maintenance procedures and products used.

7.1 Buckling

During the inspection, the inspector should observe, collect, and document the following:

- expansion space, including at transitions;
- fastener schedule;
- underlayment;
- subfloor/substrate;
  - deflection
- measurement of the peak and valley of the floor from the desired plane (undulation);
- moisture readings;
- acclimation of material, subfloor, and environment, and
- confirm humidifier and HVAC year-round settings.

If glued down, destructive testing will have to be performed to verify type of adhesive, transfer, and trowel size.

7.2 Checking

A lengthwise separation of the wood cells that normally extend across the rings of annual growth (parallel to, or along the wood rays), as results of stresses from the drying process.

During the inspection, the inspector should observe, collect, and document the following:

- flatness of material (i.e., cupping or crowning);
- finish and stain characteristics over/around/in check;
- visible change in stain;
- finish separation, and
- presence and appearance of filler.
7.3 Color Change

Undesired color variation from specified color.

During the inspection, the inspector should observe, collect, and document the following:

- species of wood;
- any repairs performed;
- type of color change;
- how many boards/planks are affected (is there a pattern to the occurrences);
- where color change is located;
  - in the field or along the edges of boards/planks – missing stain;
  - throughout/widespread – moisture issue, natural coloration/mineral streak, and
  - individual boards/planks affected or crosses over adjacent boards/planks.
- compare color of flooring to attic stock and/or store sample, if available;
- location of potted plants, windows (that have exposure to direct sunlight), or other moisture prone areas, and
- presence of area rugs.

7.4 Crowning

A “convex” or “crowned” condition or appearance where the center of individual strips becomes higher than the edges. This can also be a type of warp.

During the inspection, the inspector should observe, collect, and document the following:

- prefinished or site finished;
- if there is a pattern to the condition, if so description;
- if there is a crawl space/basement, describe condition (i.e., ground cover, joist to soil measurement, insulation, type of subfloor/substrate, visible moisture/puddles);
- expansion space;
- measure the depth of convex deviation;
- appearance of uninstalled boards/planks;
- gapping visible between boards;
- measure multiple board/plank spans (depending on board/plank width) moisture content of flooring in relation to subfloor;
- attempt to obtain pre-sanding moisture readings;
- check for delamination in engineered products;
- if repair or remodel took place attempt to determine the age of subfloor;
- maintenance methods, products and frequency used;
- examine area for impermeable products in area of concern (i.e., rubber mat);
- attempt to ascertain acclimation of product, and
- confirm humidifier and HVAC year-round settings.

7.5 Cupping

A concave or dished appearance of individual boards with the edges of the board raised higher than the center.

During the inspection, the inspector should observe, collect, and document the following:

- prefinished or site finished;
- when the condition was first observed;
• if there is a pattern to the condition;
• if there is a crawl space/basement, describe condition (i.e., ground cover, joist to soil measurement, insulation, type of subfloor, visible moisture/ puddles);
• measure the depth of concave deviation;
• appearance of uninstalled boards/planks;
• gapping visible between boards;
• measure multiple board/plank spans (depending on board/plank width);
• measure width of board/plank;
• moisture content of flooring in relation to subfloor (take and record readings at multiple depths to prove the progression of the moisture gain or loss);
• check for delamination in engineered products;
• maintenance methods, products and frequency used;
• examine for impermeable products in area of concern (i.e., rubber mat), and
• attempt to ascertain acclimation of product.

7.6 Delamination

The separation of two layers/plies within a piece of engineered flooring due to the lack of an adhesive bond is typically identified as a clean separation at the glue-line.

During the inspection, the inspector should observe, collect, and document the following:

• confirm engineered flooring;
• when the condition was first observed;
• any evidence of water damage (i.e., water intrusion, plumbing leaks, etc.);
• if separation is visible;
• that the separation is along a bond line which can be further evidenced by:
  • lack or (minimal amount) of wood tissue transfer between plies;
  • examination under UV light;
• measurement of the separation within a plank (length and depth), and
• positioning of the delamination within the plank (veneer and core or within the core layers).

7.7 Normal or Abnormal Gaps

Gaps between abutting wood floorboards in the installed floor, may be seasonal or abnormal.

During the inspection, the inspector should observe, collect, and document the following:

• determine product construction (e.g., engineered, hybrid, solid);
• when the condition was first observed;
• age of floor;
• shape of gaps;
• time of year gaps are visible;
• location of gaps (i.e., ends or sides);
• location of gaps within installation;
• gap dimensions;
• if there is a pattern to the condition (i.e., around exterior doors, sliding glass doors, windows, floor registers, at appliances, every 4’, etc.);
• measure multiple board/plank spans (depending on board/plank width) measure the individual boards/planks within the span;
• moisture content of boards/planks;
• if glue-down installation, verify bond;
• if nailed down installation check fastener schedule;
• confirm humidifier and or HVAC settings;
7.8 Gloss Variation

During the inspection, the inspector should observe, collect, and document the following:

- compare lighting in areas of concern to unaffected areas;
- amount of affected boards/planks;
- maintenance products;
- maintenance procedures;
- compare flooring to attic stock and/or store sample, and
- check for buckling, cupping, or crowning.

Manufacturer’s tolerances should be taken into account for gloss variation.

7.9 Inconsistent Bevel

This condition is exhibited as variations in the size/degree of edge beveling in a single board and/or adjacent planks as compared to other boards/planks in the installation.

During the inspection, the inspector should observe, collect, and document the following:

- grading and characteristic (i.e., hand scraped or distressed);
- if the amount of bevel is equal on all relevant edges;
- if bevel is missing on one or more edges;
- if bevel matches the rest of the installation or store sample;
- number of affected boards/planks;
- if cut ends are a factor;
- consistent application of edge finish (i.e., stain or paint), and
- rough cut on bevel.

7.10 Layout

Distribution of board lengths avoiding discernible patterns (i.e., stair step, H-joints, or short stagger).

During the inspection, the inspector should observe, collect, and document the following:

- determine number of locations with end joint stagger, stair step, and H-joints, in relation to manufacturer and industry requirements, and
- determine average length of the boards in relation to the entire square footage (i.e., shorts).

7.11 Noise

Audible squeaking and popping noises in an installed wood floor or within the floor system. An occasional squeak within any properly installed wood floor system is not abnormal.

During the inspection, the inspector should observe, collect, and document the following:

- type of underlayment (e.g., asphalt-saturated kraft paper, or #15 or #30 felt paper, rosin paper, etc.); 
- subfloor/substrate issues;
  - deflection;
  - flatness of subfloor, and
o subfloor noise(s).
- expansion space;
- direction of flooring to joists (perpendicular or parallel);
- type of installation (e.g., fastener-down, floating, glue-down);
- fastener pattern, if applicable;
- joint movement between boards/planks (if uninstalled tongue and groove material is available, measure size variation between tongue and groove);
- end joint stagger between planks, and
- confirm humidifier and HVAC year-round settings.

7.12 Shake

A separation of the wood’s fibers along the grain (parallel to the growth rings), that usually occurs between the rings of annual growth.

During the inspection, the inspector should observe, collect, and document the separation and movement of wood fibers.

7.13 Splinters

Slivers and/or splinters protrude from the surface of the floor, especially at the edges of the boards.

During the inspection, the inspector should observe, collect, and document the following:
- finish and stain characteristics over/around/in splinter;
- visible change in stain;
- finish separation;
- presence and appearance of filler;
- released or still attached;
- maintenance products;
- maintenance procedures;
- presence of splinters on uninstalled boards/planks, and
- location of fasteners, if applicable.

7.14 Splits

A tearing apart or rupturing of the wood that may run at various angles to the growth rings, commonly associated with solid products.

During the inspection, the inspector should observe, collect, and document the following:
- flatness of material (i.e., cupping or crowning);
- finish and stain characteristics over/around/in split;
- visible change in stain;
- finish separation, and
- presence of filler.
Section 8  Laminate Flooring Inspection

For a laminate inspection, the inspector should observe, collect, and document the following:

- affected area of concern;
- approximate amount of installation affected (localized or widespread);
- measurement of the widest and longest continuous span without a break/transition;
- number of doorways/cased openings, and sizes if applicable;
- substrate/subfloor type;
- type of underlayment;
- presence of moisture barrier/retarder and type;
- grade level of substrate/subfloor;
- floor prep performed;
- if the condition is increasing in frequency or severity;
- moisture testing of material and substrate;
- relative humidity and temperature;
  - of installed space;
  - of crawl space/basement;
- if crawl space:
  - is there ground cover;
  - distance from bottom of joist to ground;
  - evidence of water, and
  - ventilation vents.
- describe maintenance procedures and products used.

8.1 Buckling/Tenting

During the inspection, the inspector should observe, collect, and document the following:

- expansion space;
- deflection;
- area of concern (localized or widespread);
- damage to locking system;
- transitions, and
- measurement of longest continuous run along length and width of planks without a transition.

Swollen edges would not be considered buckling or tenting.

8.2 Cap Sheet Concerns

During the inspection, the inspector should observe, collect, and document the following:

- where is it located, i.e., edges or center of plank;
- variations of color, sheen, or gloss as compared to unaffected areas, and
- pattern or recurrence of concern.

8.2.1 Cloudy or Hazy appearance

During the inspection, the inspector should observe, collect, and document the following:

- appearance (i.e., texture, cracks, clarity, streaks);
- appearance under magnification (check for porosity);
- anything used in the area which could cause appearance variation (i.e., toys, castor chairs);
- floor protectors
8.2.2 Embossing Concerns/Off-register

During the inspection, the inspector should observe, collect, and document the following:

- measure and record visual appearance;
  - length;
  - width;
  - variation in surface texture;
  - shape;
  - size;
  - repetition/repeat pattern, and
  - specific pieces or widespread.
- appearance as compared to adjacent or unaffected areas;
- visual variations in the depth or pattern of the embossing;
- sheen variation compared to unaffected areas and uninstalled planks, if available;
- proper alignment of embossing to flooring pattern, and
- appearance as compared to store sample, if available.

8.2.3 Missing cap sheet

During the inspection, the inspector should observe, collect, and document the following:

- variations of color, sheen or gloss;
- variation in texture;
- appearance as compared to adjacent or unaffected areas, and
- appearance as compared to uninstalled planks, if available.

8.2.4 Sheen Variation

During the inspection, the inspector should observe, collect, and document the following:

- appearance compared to adjacent or unaffected areas;
- appearance compared to uninstalled planks, if available;
- maintenance products and procedures, i.e., soiling, polishes, cleaning agent residues;
- floor flatness;
- buckling or tenting;
- lighting conditions - eliminate shadows and glare;
  - walk around the planks of concern – does viewing angle change appearance, and
- look for texture variations.
Manufacturing related sheen variation will usually be on random planks throughout the installation. Locally caused sheen variation will affect multiple adjoining planks and may be splotchy or streaky. Test cleaning with ammonia can indicate if residue is left on the planks.

### 8.2.5 Porosity

During the inspection, the inspector should observe, collect, and document the following:

- check for soiling that is difficult to remove, and
- examine the cap sheet under magnification;
  - check for soiling in areas of porosity (pinholes).

### 8.3 Core Board Concerns

During the inspection, the inspector should observe, collect, and document the following:

- when was the condition first noticed;
- is the condition stable or progressing;
- where is it located (i.e., edges or center of planks);
- sander marks, dips, voids, or bumps/lumps;
- fracturing of the cap sheet/décor layer, and
- foreign matter under the cap sheet;
  - insects;
  - pieces of torn décor layer, and
  - other debris/trash, dirt, ink marks, etc.

These observations are to determine manufacturing related core board concerns only. Concerns such as swollen joints or damage to the core board during installation are not manufacturing related and will manifest differently.

### 8.4 Delamination

Delamination is a separation between the layers which make up a laminate plank. This can be between the cap sheet and décor layer or décor layer and core board.

During the inspection, the inspector should observe, collect, and document the following:

- Where is it located, i.e., edges or center of planks, and
- Apply pressure to affected area to check for movement to identify delamination condition as opposed to swollen edges and core board concerns.

### 8.5 Gapping

The inspector should investigate the locking system used during installation. Glued products will move (expand and contract) as a monolithic unit. Glueless products will move (expand and contract) as individual planks.

During the inspection, the inspector should observe, collect, and document the following:

- progression of concern;
- where gaps are located;
- size of gaps;
- appearance of gaps (i.e., uniform or wedge-shaped);
- examination of edge bevel;
• installation tools used;
• subfloor/substrate issues;
  o deflection, and
  o flatness of subfloor
• expansion space;
• longest runs along width and length of planks without a transition;
• end joint stagger;
• if gaps can be closed/opened;
• location of HVAC ducts and registers if in area of concern;
• integrity of locking mechanism;
• damage to locking mechanism;
• confirm or negate if irregular-shaped swollen edges are present, and
• confirm HVAC year-round settings.

Gapping can be manufacturing related due to poor milling of the locking mechanism. Examination of uninstalled planks should be done to confirm the concern is manufacturing related.

8.6 Noise

During the inspection, the inspector should observe, collect, and document the following:

• location(s) of condition
• underlayment;
• end joint stagger between planks;
• wax/sealant/dressing application;
• subfloor/substrate issues;
  o deflection;
  o flatness of subfloor, and
  o subfloor noise(s).
• expansion space/locked-in;
• improper milling;
• repeatability/frequency of occurrences;
• assembling uninstalled material if available to replicate noise, and
• confirm HVAC year-round settings.

If the flooring is locked-in and buckling, the inspector should not provide flatness measurements as they may not be accurate.

8.7 Photo/Décor Layer Concern

8.7.1 Fading

Fading is a concern where there is a loss of color within the décor layer, this should not be confused with a cloudy finish in the cap sheet. This is usually seen around areas with direct sunlight.

During the inspection, the inspector should observe, collect, and document the following:

• location (i.e., by doors, windows, or away from direct sunlight);
• examine shape and color variation (i.e., rug or furniture repositioning);
• appearance compared to adjacent or unaffected areas;
• appearance compared to uninstalled planks, if available, and
• appearance under magnification.

8.7.2 Pattern Alignment/Off-register
During the inspection, the inspector should observe, collect, and document the following:

- appearance compared to adjacent or unaffected areas;
- appearance compared to uninstalled planks, if available;
- appearance compared to store sample, if available;
- if pattern is misaligned, measure variation;
- check for repeating patterns and their presence in the installed field;
- ascertain if the concern is unique or if it is found in other planks of similar pattern, and
- check for presence of damaged décor layer.

### 8.8 Proud/Raised Edge(s)

During the inspection, the inspector should observe, collect, and document the following:

- progression of condition;
- installation tools used;
- location on planks;
  - long side;
  - short side, and
  - corners;
- measurement of variations – may be measured with feeler, depth, or taper gauge;
- press down on suspect areas to ascertain whether or not the joint moves;
- confirm or negate if irregular-shaped swollen edges are present;
- deflection;
- expansion space;
- subfloor/substrate flatness, and
- examine uninstalled planks.

If the flooring is locked-in and buckling, the inspector should not provide flatness measurements as they may not be accurate.

When manufacturing related, the concern usually runs the entire edge of the plank. If suspected manufacturing related, manufacturer's tolerances should be taken into account.

When installation related the inspector should check for tapping block damage and damage to the core. Lack of expansion space can cause damage to the core which can show as raised edges.

Swollen edges can present on only one side of the plank. The inspector should look for an irregular or rounded shape to the area of concern.

### 8.9 Surface concerns (scratches, chips, and dents)

During the inspection, the inspector should observe, collect, and document the following:

- where is it located (i.e., edges or center of planks);
- type of concern;
- layers of construction affected (e.g., does it penetrate into decorative layer or core?);
- does the concern cross adjoining planks;
- is concern isolated or throughout;
- is concern found in uninstalled material;
- appearance of concern;
  - fractured;
  - texture;
size of concern, and
evidence of impact damage.

- appearance under magnification;
- is the condition stable or progressing;
- furniture relevant to the concern (e.g., wheel/caster type);
- floor protectors;
  - what type;
  - what size, and
  - physical condition.
- number and type of pets;
- toys, shoes or equipment used inside the home;
- exterior contaminant transfer, and placement and condition of walk off mat(s);
- pattern, direction, and frequency of concern, and
- maintenance products used.

8.9.1 Micro-chipping

During the inspection, the inspector should observe, collect, and document the following:

- examination of edges under magnification;
- consistency of side affected;
- contiguous, crescent-shaped appearance;
- installation tools used,
- uninstalled planks.

8.10 Swollen Joints

During the inspection, the inspector should observe, collect, and document the following:

- area of concern near water source i.e., refrigerator with water line, dishwasher, sink;
- moisture reading over area of concern and in unaffected area;
- appearance of joint under magnification;
- examine exterior of structure for possible cause of concern, and
- if the swelling meets on both sides on the joint.

8.11 Warped Planks

The inspector should attempt to assemble uninstalled planks.

8.11.1 Crook (Banana Boards)

The inspector should confirm measurement of the space left between the edge of the plank and the edge of the straight edge using a taper gauge or feeler gauge.

Crook can be caused by improper storage of material.

8.11.2 Concave Bowing

The inspector should confirm measurement of the space between the top of the plank and the bottom of the straight edge with a taper or feeler gauge in width or length.

8.11.3 Convex Bowing
The inspector should confirm measurement of the space left between the plank and the bottom of the straight edge with a taper or feeler gauge in width and length.
Section 9 Stone, Ceramic Flooring Inspection

For a stone or ceramic tile inspection the inspector should observe, collect, and document the following:

- affected area of concern;
- nominal format of the tile and the pattern of the installation;
- note the finish of the surface whether it be glazed, polished, honed, flamed;
- confirm the type of grout and general width of the joint;
- substrate/subfloor type;
- grade level of substrate/subfloor;
- type of underlayment;
- overall construction and support system, i.e., pier and beam, joists, crawl space, etc.;
- try to ascertain acclimation of product;
- if condition is increasing in frequency or severity, and
- maintenance procedures and products.

9.1 Tile Concerns

9.1.1 Warpage

During the inspection, the inspector should observe, collect, and document the following:

- examine uninstalled material;
- measurement of face of tile in both lengthwise and diagonal dimensions, and
- may be present in lippage concerns.

Note: The industry tolerance for this condition will be found in ANSI A137.1 American National Standards Specifications for Ceramic Tile.

9.1.2 Out of square (Wedging)

Will present as an issue when there is difficulty maintaining a consistent grout joint.

During the inspection, the inspector should observe, collect, and document the following:

- confirm 90-degree corners of an uninstalled tile;
- measure the variation in the grout joint width;
- measure the variation of the tile offset;
- verify possible shift in tile placement, and
- accurate measurements of each side and both diagonal dimensions may also be used to confirm.

Note: The industry tolerance for this condition will be found in ANSI A137.1 American National Standards Specifications for Ceramic Tile. Rustic style tiles are not held to the same tolerances.

9.1.3 Chipping

During the inspection, the inspector should observe, collect, and document the following:

- examine the areas of concern to identify specific issues;
- describe in detail the difference in appearance between the occurrences;
- examine affected areas under magnification;
- examine the presence of grout in the chipped areas;
- any service work done, including any repairs to the floor, and
document lippage conditions in the area of concern.

Note: Hairline fractures surrounding the chipped area may indicate topical impact. Another possible cause may be an issue in the surface of the tile whereby the pattern or glaze layer(s) are not properly bonded to the tile body.

9.1.4 Tile Cracking

During the inspection, the inspector should observe, collect, and document the following:

- If cracking crosses several tiles and continues through adjoining grout joints, examine substrate for issues;
- Is there a repeat pattern to the condition;
- Examine cracks in the subfloor or substrate for telegraphing through to the tile surface or if the tiles having been installed directly over a control joint;
- examine the floor for the presence of hollow tiles;
- check for deflection, and
- Examine for fine lines which may represent compression cracking.

Note: Destructive testing will have to be performed to confirm. In natural stone tile, what may be perceived as a crack may actually be a naturally occurring inclusion or vein in the product.

9.1.5 Facial Defects

Are generally manufacturing related, but often do not detract from the appearance or the lifespan of the tile service. ANSI A137.1 American National Standards Specifications for Ceramic Tile lists specific guidelines for examining ceramic tile for these conditions.

In the case of natural stone, pits, voids and fissures may be present and are considered to be inherent to the product. The inspector should note the dimensions of such characteristics and refer to the National Stone Institute (formerly the Marble Institute of America, Version 8) - Dimension Stone Design Manual; Chapter 22-1 (formerly Appendix A), Tolerances in the Dimension Stone Industry.

9.1.6 Crazing

Crazing is considered a manufacturing related condition. The glaze on the tile surface exhibits spider cracking and often is only seen at close range. The visibility should be considered when inspecting this condition. Check for grout in the occurrences under magnification. Place awl in cracks to determine if the tile body is visible.

9.1.7 Bubbles

Bubbles on the surface of the tile may indicate a lack of bond between the surface glazing and the tile body. During the inspection, the inspector should observe, collect, and document the following:

- tapping the bubble which should emit a hollow sound if there is separation from the tile body;
- any chipping in area of concern, and
- the size of the anomaly and frequency of occurrence.

9.1.8 Bumps

Bumps differ from bubbles in that they are solid and well-bonded to the tile body. They often indicate debris or foreign substance under the glazing.

During the inspection, the inspector should observe, collect, and document the following:
• tapping the bump which will not emit a hollow sound, and
• the size of the anomaly and frequency of occurrence.

9.1.9 Color, Texture and Gloss Variations

The manufacturer’s product literature will list a V-rating which will indicate the inherent texture and color variations to be expected in the styling of the tile. The explanation of this rating is found in the ANSI A137.1 American National Standards Specifications for Ceramic Tile and in the TCNA handbook. The inspector should refer to this table when examining an installation for this concern.

It is recommended that the inspector attempt to research the invoice/shipping documents and box labels to determine if all material was from the same production lot.

9.1.10 Lippage

Conditions may be found to be within industry tolerance but are deemed unsatisfactory to the end user. Several factors should be considered when evaluating this condition. Each installation will be unique as the tolerance is based on specific installation information (i.e., average grout joint width, warpage observed to be within ANSI A137.1 American National Standards Specifications for Ceramic Tile specifications, thickness variations and lighting).

During the inspection, the inspector should observe, collect, and document the following:

• determine the average grout joint width;
• measure the approximate average warpage;
• identify locations of uneven tile surfaces, and
• measure the occurrences (this may be accomplished using a feeler gauge, depth gauge or similar instruments).

With the increased use of large format tile with rectified edges and narrow grout joints, the perception of lippage is often an unexpected issue with some end users. Running bond installations also present an increased chance of the inspector being called into examine an installation where the end user has expressed this complaint.

9.1.11 Hollow Sounding Tile

During the inspection, the inspector should observe, collect, and document the following:

• sound the floor and determine;
  • count or percentage of hollow tile, and
  • describe reverberation;
• approximate percentage of hollow sound per individual tile;
• check for perimeter expansion space accommodation;
• check for presence of field soft joints;
• measure continuous span of tile;
• attempt to ascertain the type of subfloor/substrate, and
• check structure for evidence of subsequent movement.

When membranes and crack isolation products are used, there may be a difference in the sound noted than when the tile is directly bonded to the substrate; however, there should be consistency throughout. Variations in sound may be noticed with sounding equipment in either type of installation.
9.2 Grout Concerns

9.2.1 Pinholes in the grout

During the inspection, the inspector should observe, collect, and document the following:

- try to ascertain the amount of water added to the grout mixture;
- try to ascertain the speed of the mixing tool used;
- try to ascertain if excessive water was used in clean up (look for rake marks across the joints and washed out pigment);
- check for soft grout, and
- check for powdery grout.

Note: This condition will not usually be found in pre-mixed grouts if the installer adhered to product directions. However, the same conditions may be experienced with 100% Solids epoxy and furan grout products, which can result from high speed mixing, entrapping air under the grout and air pockets under tiles. Excessive water and/or agitation during cleaning can also result in this condition.

9.2.2 Powdery or soft grout joints

Will be exhibited by low joints as well as gouges and dislodged material.

During the inspection, the inspector should observe, collect, and document the following:

- loose or missing grout and grainy material in the joints
- attempt to verify if the grout used was out of date;
- try to ascertain if grout may have been partially hydrated and remixed;
- try to ascertain possible exposure to temperature extremes;
- try to ascertain installation clean-up methods;
- try to ascertain the amount of water added to the grout mixture;
- try to ascertain if contaminated grout ingredients were used;
- try to ascertain the number of bags used and how were they mixed, and
- maintenance products and procedures;

Note: If the tile was highly absorbent, this may have prevented the grout material from being properly hydrated. A premature application of a petroleum-based sealer may have also resulted in this condition. Pre-mixed and epoxy grouts may also be subject to soft conditions.

9.2.3 Grout Voids

During the inspection, the inspector should observe, collect, and document the following:

- examine for dislodged sections of material;
- check for bubble(s) created by air or water in the grout mixture, and
- examine areas of void under magnification.

9.2.4 Variations in Grout Color

During the inspection, the inspector should observe, collect, and document the following:

- try to accumulate as much information about the placement of the grout to include but not limited to:
o how was the grout mixed;
○ how much water was used in the mix;
○ how many bags were used;
○ how many bags were mixed together;
○ expiration date or product batch code;
- varying grout colors can indicate a repair was performed;
- the removal of pigment during grout clean up, and
- maintenance product and procedures.

Note: In the case of pre-mixed grout, the color should be more consistent assuming the grout has been
used in accordance with the manufacturer’s instructions.

The inspector may determine the presence of a remaining spacer by a color variation at the corners of the
joints.

9.2.5 Grout Joint Widths

During the inspection, the inspector should observe, collect, and document the following:

- the range of the grout joint width;
- the average width of grout joint;
- the range of the facial dimension if within ANSI A137.1 American National Standards Specifications
  for Ceramic Tile specifications, and
- check that smaller tiles are centered to larger tiles;
- try to ascertain if the rows of tile were set plumb.

When tiles are tilted during installation the grout joint width can be altered. A similar effect may be seen if
the grout material extends onto the face of the tile. All of the above conditions are installation related.

9.2.6 Grout Haze

During the inspection, the inspector should observe, collect, and document the following:

- if cementitious grout was used, place a mild acid on the occurrences (do not use an acid on the
  surface of a natural stone);
- check under magnification, and
- maintenance products and procedures.

Variations in reflection of natural light may also be perceived as grout haze. Conditions of this type are
inherent to the styling and characteristics of the tile.

9.2.7 Cracking Grout

The inspector should inquire as to which grout was used selected, as the improper specification of material
and joint width may leave the installation vulnerable to this condition.

During the inspection the inspector should observe, collect, and document the following:

- inquire as to which grout (manufacturer name and type, i.e., epoxy, cementitious) was used;
- measure range in grout joint widths;
- describe the presence of patterns to the cracking observed;
- check for tile cracking;
- check for presence of expansion joints (soft joints);
- check for tenting;
• perform sounding tests, and
• check integrity of the grout material.
Section 10: Resilient Flooring Inspection

For a resilient flooring inspection, the inspector should observe, collect, and document the following:

- description of concern;
- approximate amount of installation affected (localized or widespread);
- description of any attempted repairs and methods used in repair;
- substrate/subfloor type;
- type of underlayment;
- presence of moisture barrier/retarder and type;
- grade level of substrate/subfloor;
- floor prep performed;
- if the condition is increasing in frequency or severity;
- relative humidity and temperature
  - of installed space;
  - of substrate;
  - of crawl space/basement.
- if crawl space:
  - is there ground cover;
  - distance from bottom of joist to ground;
  - evidence of water, and
  - ventilation vents.
- if floating installation:
  - measurement of the widest and longest continuous span without a break/transition;
  - expansion space;
  - deflection;
  - presence of additional underlayment, and
  - substrate/subfloor flatness.
- gap between moldings, jambs, etc. and the surface of the flooring, and
- describe maintenance procedures and products used.

10.1 Curling

Also known as concave bowing. During the inspection, the inspector should observe, collect, and document the following:

- measure the height difference across the tile/plank;
- attempt to confirm acclimation of product and subfloor/substrate;
- expansion space, including pinch points (i.e., pool table, trim moldings);
- moisture readings (note: moisture readings are only indicative not verification of moisture, further testing should be performed);
- all previous moisture test results;
- temperature of flooring under direct sunlight and in unaffected areas;
- maintenance products and methods;
- check for delamination;
- if sheet product check;
  - proper application of seam sealer, and
  - perimeter for adhesive application;
- examine uninstalled flooring material, and
- confirm HVAC year-round settings.

Note: Curling can be installation related (in glue down applications) if product is not properly rolled, incorrect/worn trowel, incorrect or inconsistent adhesive application (rolled, sprayed, or troweled), inadequate or improper acclimation, improper floor prep.
1. If suspected manufacturing related, all of the above including verification of acclimation, verification of adhesive type and application, verification of floor prep, and verification of year-round HVAC settings should be done. Destructive testing will have to be performed.

10.2 Delamination

Delamination is a separation between layers of the flooring material which can include; the wear layer, topcoat, stabilizer, print film, photo layer, core material or backing.

During the inspection, the inspector should observe, collect, and document the following:

- where it is located (i.e., at joints or seams, in center of plank or sheet);
- deflection which may make the appearance of delamination;
- subfloor/substrate flatness;
- damage to edges of planks;
- heavy rolling traffic (i.e., castor chairs, rolling islands), and
- cut areas not seam sealed;

Note: Delamination for the purpose of this document occurs within the product and is not the same as delamination between the product and substrate/substrate.

If product comes with an attached cushion, separation between the cushion and the backing denotes a bond failure.

10.3 Discoloration

Discoloration is a change in the color or hue of the flooring. During the inspection, the inspector should observe, collect, and document the following:

- measurement of the concern;
  - length;
  - width;
  - shape and size;
- variation in color (e.g., yellowing);
- repetition/repeat pattern;
- is concern related to seam sealer or treatment;
- across one tile, plank or sheet or affecting multiple pieces;
- moisture readings (note: moisture readings are only indicative not verification of moisture, further testing should be performed);
- if discoloration is uniform and throughout the installation or only in a certain area(s);
  - record specific location(s) such as; under or around appliances, near windows, glass door(s) or entry door(s), heating and cooling vents, radiant heating fixtures, etc.;
  - present only in traffic lanes or work areas, and
  - tracking from parking areas or driveways.
- floor mats/entry matting system;
  - type of backing;
  - location of matting;
  - condition of matting, and
  - size of matting.
- maintenance products;
  - type of cleaning products (e.g., cleaning agent, quaternary disinfectants);
  - floor finish applied;
10.4 Doming

Also known as pillowing, or convex bowing. During the inspection, the inspector should observe, collect, and document the following:

- measure the height difference across the tile/plank;
- attempt to confirm acclimation of product and subfloor/substrate;
- expansion space, including pinch points (i.e., pool table, trim moldings);
- moisture readings (note: moisture readings are only indicative not verification of moisture, further testing should be performed);
- temperature of flooring under direct sunlight and in unaffected areas;
- maintenance products and methods;
- examine uninstalled planks.tiles;
- confirm HVAC year-round settings, and
- examine uninstalled flooring material;

Note: Doming can be installation related (in glue down applications) if product is not properly rolled, incorrect/worn trowel, incorrect or inconsistent adhesive application (rolled, sprayed, or troweled), inadequate or improper acclimation, improper floor prep.

If suspected manufacturing related, all of the above including verification of acclimation, verification of adhesive type and application, verification of floor prep, and verification of year-round HVAC settings should be done. Destructive testing will have to be performed.

10.5 Gapping

Gapping is the separation between tile and plank joints or seams in sheet flooring. During the inspection, the inspector should observe, collect, and document the following:

- area(s) of concern, (i.e., near windows, doors, localized or widespread);
- confirm installation method (glue down, floating, loose lay);
- design of installation (i.e., herringbone, pattern);
- where gaps are located;
- size of gaps;
- appearance of gaps (i.e., uniform or wedge-shaped);
- examination of edge bevel;
- installation tools used;
- subfloor/substrate issues;
- deflection;
- flatness of subfloor
- longest runs along width and length of planks without a transition;
- end joint stagger;
- expansion space;
- location of blinds, if applicable;
- temperature of flooring under direct sunlight and in unaffected areas;
- acclimation of flooring material;
- acclimation of subfloor/substrate;
- confirm HVAC year-round settings;
- for sheet goods, determine if seam sealer was applied or seams were heat welded, and
measure several installed and uninstalled planks;

Note: Gapping can be installation related (in glue down applications) if product is not properly rolled, incorrect/worn trowel, incorrect or inconsistent adhesive application (rolled, sprayed, or troweled), inadequate or improper acclimation, improper floor prep.

If suspected manufacturing related, all of the above including verification of acclimation, verification of adhesive type and application, verification of floor prep, and verification of year-round HVAC settings should be done. Destructive testing will have to be performed.

**10.6 Gouge/Scratch/Tear**

Gouge is a groove or cavity in the flooring surface accompanied by material removal and penetration below the immediate flooring surface. Scratch is a shallow cut or narrow groove in the flooring surface. A line or furrow made in the flooring surface by rasping or rubbing with a pointed or jagged object. Tear is a hole or rip in the material.

During the inspection, the inspector should observe, collect, and document the following:
- overall appearance of the flooring
- location of moveable objects near the area of concern;
- type of traffic in area of concern;
- type of equipment, furniture or appliances in area;
- pattern to concern;
- for planks and tiles: localized to specific piece or across multiple pieces;
- severity of scratch, rip or tear: depth, width, length;
- presence of sharp objects, rough surfaces, embedded debris, defective or damaged chair glides; and casters;
- evidence of smaller scratches or abrasions;
- patterns to the scratches/gouges which can indicate the object that caused the issue;
- layers of the flooring affected;
- location of tear near outside corners, door jambs, appliances, equipment, etc.
- verify type of activity on surface of the flooring, and
- if walkers, wheelchairs or other assistive devices are used in the area verify condition of wheels, legs, etc., check tennis balls for debris buildup.

**10.7 Indentation**

Depression in the surface of resilient flooring beyond the inherent texture of the pattern.

During the inspection, the inspector should observe, collect, and document the following:
- identify furniture and objects that could cause indentation;
- measure the size, shape and contact point of the object to the flooring material;
- identify how often object is moved or relocated;
- the type of traffic on the floor, i.e., narrow high heels, heavy rolling loads, etc.;
- adhesive displacement: look for ridges around the indentation which would indicate the adhesive was “displaced” or “deformed out from the applied load, and
- compressible, acoustical, or soft-core underlayment can compress and prevent the flooring from recovery.

**10.8 Ledging**

During the inspection, the inspector should observe, collect, and document the following:
deflection in floor and at joint(s) of concern;
flatness of floor;
debris under area of concern;
expansion space;
repairs performed;
examine for broken locking mechanism in floating floors, and
check attic stock thickness or thickness of installed product if possible.

Note: Manufacturer and industry tolerances should be taken into account.

10.9 Off-Register Embossing and Pattern

During the inspection, the inspector should observe, collect, and document the following:

- measure and record visual appearance;
  - length;
  - width;
  - variation in surface texture;
  - shape;
  - size;
  - repetition / repeat pattern, and
  - specific pieces or widespread.
- appearance as compared to adjacent or unaffected areas;
- visual variations in the depth or pattern of the embossing;
- sheen variation compared to unaffected areas or uninstalled material, if available;
- proper alignment of embossing to flooring pattern, and
- appearance as compared to store sample, if available.

10.10 Out of square

Seen as wedge-shaped gaps. During the inspection, the inspector should observe, collect, and document the following:

- measure the planks for out of square;
- measure flatness of substrate/subfloor;
- design of installation (i.e., herringbone, pattern);
- rack several planks together to determine if installed out of square.

Note: Manufacturer and industry tolerances should be taken into account.

10.11 Peaking

During the inspection, the inspector should observe, collect, and document the following:

- area(s) of concern, (i.e., near windows, doors;
- localized or widespread;
- confirm installation method (glue down, floating, loose lay);
- appearance of concern;
- location of blinds, if applicable;
- temperature of flooring under direct sunlight and in unaffected areas;
- acclimation of flooring material;
- acclimation of subfloor/substrate;
- confirm HVAC year-round settings;
- deflection;
expansion space;
repairs performed;
examine for broken locking mechanism in floating floors;
movement of flooring at peak and note if only one or both sides of joint moves vertically;
gap between moldings and surface of the flooring, and
examine uninstalled flooring material.

10.12 Seams

Seam: The line along which two pieces of sheet flooring are joined.

During the inspection, the inspector should observe, collect, and document the following:

- quality of seam cut;
- amount of seam area affected by the concern;
- description of gaps, ledging, voids, or curling at seam line;
- size of gapping, ledging or curling (in width, height, and variation of thickness);
- is the seam well bonded to the substrate;
- presence of bubbles or air pockets;
- if the seam was cut net, short, full, or compression fit, and
- presence of delamination.

10.12.1 Heat-welded Seam

A seam produced by grooving abutting edges of resilient flooring and filling the groove with heated, fused, or melted material (usually from a weld rod) to provide a bond and seal, should be performed in accordance with ASTM F1516-13(2018) Standard Practice for Sealing Seams of Resilient Flooring Products by the Heat Weld Method (when Recommended).

Excess welding material is trimmed flush with the finished flooring after cooling.

During the inspection, the inspector should observe, collect, and document the following:

- condition of weld surface;
  - ledging, concave appearance, or trimmed flush to flooring,
- depth of groove;
- width of groove;
- amount of groove on both pieces of flooring – groove should be centered between both pieces;
- if seam is consistent in appearance;
- if chatter marks are present;
- if flooring material was cut or damaged from skiving, and
- voids in weld rod or between pieces of flooring.

10.12.2 Cold-weld/Chemical-weld Seam

A seam produced by adjoining cut edges of resilient sheet flooring and adhering the edges with a chemical formulated to bond the edges, should be performed in accordance with ASTM F693-01(2018) e1 Standard Practice for Sealing Seams of Resilient Sheet Flooring Products by Use of Liquid Seam Sealers.

During the inspection, the inspector should observe, collect, and document the following:

- presence of areas of inconsistency along the seam line;
- size and shape of voids between bonded areas of the seam;
- is seam sealer or cold-weld material on the surface of the flooring;
- amount of seam area affected by the condition;
- amount of gapping, ledging, or curling at the seam line;
- size (in width or height) of gapping, ledging or curling;
- is the seam well-bonded to the substrate;
- are bubbles or air pockets present;
- are the two pieces of material bonded to each other;
- is the seam cut net, full, compression fit, or with a gap between the sheets;
- size of all gaps or voids in the seam, and
- identify seam net, full, compression fit, or with a gap between the sheets.
   - method of application;
   - amount;
   - location, and
   - appearance.

Note: Joint: The junction of precut surfaces butted together, such as tile, plank or underlayment panels.
Seams are in sheet products. Joints are in plank/tile products. Do not use the terms interchangeably.

10.13 Sheen Variation

During the inspection, the inspector should observe, collect, and document the following:

- appearance compared to adjacent or unaffected areas;
- appearance compared to uninstalled material, if available;
- maintenance products and procedures (i.e., soiling, polishes, cleaning agent residues);
- floor flatness;
- curling or doming;
- lighting conditions - eliminate shadows and glare;
   - walk around the area of concern – does viewing angle change appearance;
- look for texture variations, and
- check arrow direction on directional products.

10.14 Telegraphing

Irregularities, imperfections, patterns, etc. under the finished floor which are transmitted to the surface and become visible.

During the inspection, the inspector should observe, collect, and document the following:

- measurement of concern;
  - length;
  - width;
  - shape;
  - size, and
  - repetition/repeat pattern.
- location of where the concern(s) are visible;
- installation issues or deficiencies in subfloor/substrate/underlayment;
- visibility of concern as a result of ambient or supplemental lighting (e.g., windows);
- if the visibility of the concern worsens at any time during the day or evening;
- if there are cracks or voids in the subfloor/substrate/underlayment, and
- try to ascertain if floor prep was performed.
Section 11 Limitations, Complexities, Complications and Conflicts

Floor covering inspectors may face many conditions that present numerous challenges produced by limitations, complexities, complications, or conflicts. Inspectors should have a thorough understanding of these issues and communicate them to all appropriate parties. A definition for each of these challenges follows:

11.1 Limitations

The act of limiting or the state of being limited, constrained, or restricted. For purposes of this Standard, a “limitation” is a restriction placed by others upon a flooring inspector that results in a limit on the scope of work, documentation, or data collection that can affect the conclusiveness or clarity of the inspection report.

Limitations are restrictions that are placed upon Inspectors by another party that result in a limit on the scope of work documentation, or data collection that can affect the conclusiveness or clarity of the inspection report, which may include but are not necessarily limited to:

- inspectors are not allowed to take pictures of certain areas or items due to restrictions from an involved party;
- inspectors are prevented from performing certain tests such as product removal, sample collection, or destructive procedures;
- inspectors are prevented from contacting certain involved parties like installers, end users or retailers; and
- materially interested parties fail to provide pertinent information by not answering questions or returning attempts at correspondence.

Only the commissioning party or their representative can impose limitations on the inspection. If an attempt to impose a limitation is initiated by any other materially interested party, the commissioning party should be advised. Limitations should be defined in writing. Limitations placed on any project that are inconsistent with this Standard can result in a conflict.

11.2 Complexities

When the situation is extensive or intricate. For the purposes of this Standard, a “complexity” is any condition that causes the project to become more difficult or detailed, but does not prevent the inspection from being adequately performed.

Complexities are conditions that cause a project to become more difficult or detailed, but do not prevent the inspection from being performed adequately, which can include but are not limited to:

- inconvenient or limited parking areas, impassable roads;
- limited access to site or party with historical perspective;
- the Inspection has to be completed after normal business hours or has to be completed within a specific time period;
- the Inspection site becomes a problem because of building-specific uses, such as being a school, bank, hospital, or public building; and
- weather or environmental conditions which might affect accessibility.

11.3 Complications

The state of being complex, intricate or perplexing. For purposes of this Standard, a “complication” is generally any condition that arises after the start of the inspection and causes or necessitates a change in the scope of the inspection.
Complications are conditions that arise after the start of work that cause or necessitate a change in the scope of activities to include, but are not limited to:

- multiple issues are pointed out by a materially interested party other than the commissioning party;
- the flooring has already been removed and disposed of, or is being stored in a different environment like a garage or warehouse; and
- the floor has been repaired or evidence of the issue is not available.

11.4 Conflicts

When there is a state of disharmony or tension between the parties involved. For purposes of this Standard, a “conflict” is a limitation, complexity or complication that results in a disagreement between parties involved about how the inspection, documentation and data collection is to be performed. Related to this, a conflict of interest is a set of circumstances that creates a risk where professional judgment or actions regarding a primary interest will be unduly influenced by a secondary interest.

Before beginning the inspection, known limitations and complexities, and their consequences should be understood, discussed, and approved in writing by the inspector and materially interested parties. A discussion of each of these challenges follows.

Conflicts are limitations, complexities, or complications that result in disagreements between the parties involved such as: how the inspection is to be completed; what tests can be performed; or if presence of legal counsel is required. When conflicts develop or limitations are placed on the inspector by materially interested parties, which prevent compliance with this Standard, the inspectors are expected to stop work until conflicts are resolved. No matter what the outcome, conflicts should be documented in writing as to the cause and how they were resolved. Conflicts include but are not limited to:

- Opposing legal counsel prevent tests required to determine cause;
- involved parties are in disagreement on who is responsible for paying for the inspection, and
- inspector Conflict of Interest (COI) means that because of other activities or relationships with other materially involved parties, an inspector is unable or potentially unable to render impartial assistance to the client, or the person’s objectivity in performing the inspection is or might be otherwise impaired. COI is a concern when the Inspector is in a situation in which its own or its affiliates’ interests could prevail over the interest of the client.