

SECTION 096403

CERTIFIED WOOD FLOORING

CSI 3-PART **LONG-FORM** GUIDE SPECIFICATION
USE FOR CONTRACT DOCUMENT (CD) SPECIFICATION ISSUES
EDIT TO SUIT PROJECT

PART 1 - GENERAL

1.1 SUMMARY

- A. Work of this Section includes but is not limited to certified sustainable solid wood flooring and accessories.
- B. Related Documents and Sections: Examine Contract Documents for requirements that directly affect or are affected by Work of this Section. A list of those Documents and Sections include, but is not limited to, the following:
 - 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and DIVISION 01 General Requirements, Specification Sections, apply to this Section.
 - 2. SECTION 033000, CAST-IN-PLACE CONCRETE: Concrete substrates including moisture content for wood flooring applications.
 - 3. SECTION 060530, CERTIFIED WOOD TYPES: Forest, tree and timber management and sourcing.
 - 4. SECTION 061603, CERTIFIED WOOD SHEATHING: Underlayment.
 - 5. SECTION 072100, THERMAL INSULATION: Underlayment and vapor retarder.
 - 6. SECTION 099300, STAINING AND TRANSPARENT FINISHING: Staining and top-coating.
 - 7. SECTION 098000, ACOUSTICAL TREATMENT: Underlayment.

1.2 REFERENCES

- A. Abbreviations and Acronyms per SECTION 011000, SECTION 014000, and as follows:
 - 1. AHJ. Authority Having Jurisdiction from local, state and federal regulatory agencies.
 - 2. CoC. Chain-of-Custody.
 - 3. Per. In accordance with.
 - 4. RH. Relative humidity.

NOTE: Edit Definitions and References below to suit project.

NOTE: Items may also be moved to Section 014000 and deleted here.

- B. Definitions per SECTION 011000, SECTION 014000, and as follows:
 - 1. Certified Wood: Independent third party (FSC) verified wood from forests complying with responsibly managed forest standards that meet broad social, economic and environmental goals.
 - 2. Engineered Wood Flooring: Factory pre-finished or Unfinished wood veneer top layer laminated to a dimensionally stable core material that are interlocked as units to create an assembly that may be installed by nail-down, glue-down or as a floating installation.
 - 3. FSC: Forest Stewardship Council; www.fsc.org
 - a. [FSC Forest Management Certification](#)
 - b. [FSC CoC](#)
 - c. [FSC Controlled Wood](#)
 - 1). FSC Pure

- 2). FSC Mixed
- 3). FSC Recycled

NOTE: There are no engineered wood flooring manufacturers within Vermont, and as such this section does not address it.

4. **HAP.** Hazardous Air Pollutant
 5. **LEED®.** Leadership in Energy and Environmental Design, a set of USGBC rating programs applicable to construction projects.
 6. **Microbevel.** A very small bevel at the end of your already-beveled edge.
 7. **Northern Forest:** Timber stands that range from the NY Adirondacks through Vermont and New Hampshire up into Maine. <http://www.northernforestalliance.org/explore.htm>
 8. **Planks:** Wood flooring boards wider than 3 inches and typically up to 5 inch, but can be as wide as 20 inches or the width of the tree.
 9. **Strips:** Wood flooring boards less than 3 inches in width.
 10. **Sustainably Harvested Wood:** Wood harvested from forests managed in accordance with stated environmental, social, economic, legal, forest management, and systematic validation principles such as those proffered by the Northern Forest Alliance <http://www.northernforestalliance.org/about/sustainforest.htm>, FSC www.fsc.org/index.php?id=pc, ATFM http://65.109.144.60/cms/test/26_34.html and SFI <http://www.sfi-program.org/files/pdf/sfi-standard-2005-2009-sept%2008%20update.pdf>.
 11. **Sustainable Forest Management:** The UN-FF (United Nations Forum on Forests) in 2004 adopted these seven themes of sustainable forest management: Extent of forest resources; Biological diversity; Forest health and vitality; Productive functions of forest resources; Protective functions of forest resources; Socio-economic functions; and Legal, policy and institutional framework.
 12. **Sustainably Recycled Wood:** Wood products certified by a third party to be made from reused, reclaimed or salvaged wood timbers or post-consumer wood products.
 13. **VOC. Volatile Organic Compounds** are chemical compounds that have a high vapor pressure and low water solubility. They include a variety of chemicals, some of which may have short- and long-term adverse health effects when concentrated indoors.
- C. Referenced Standards per SECTION 014000 and as follows:
1. **ALSC.** American Lumber Standard Committee; www.alsc.org
 - a. **Lumber Grading Rules**
 2. **ANSI.** American National Standards Institute; www.ansi.org
 3. **ASTM.** ASTM International; www.astm.org
 - a. ASTM D6570, Standard Practice for Assigning Allowable Properties for Mechanically Graded Lumber
 4. **AWI.** Architectural Woodwork Institute
 - a. AWI - Quality Standards, 8th Edition, Version 1.0, 2003.
 - b. AWI / AWMAC / WI – Architectural Woodwork Standards – 2009, 1st Edition

NOTE: The AWS will be printed and available for distribution before August 1. The Woodwork Institute will adopt it as their official standard for work bidding after Oct 31, 2009.

5. **AWPA.** American Wood Preservers Association; www.awpa.com
6. **BAAQMD.** Bay Area Air Quality Management District; www.baaqmd.gov
7. **CARB.** California Air Resources Board, a department of the California Environmental Protection Agency; www.arb.ca.gov

NOTE: CARB regulations (required by LEED™) govern formaldehyde emissions in both raw composite wood panels and finished products sold or used in California.

Both imported and domestic products are regulated and must be third-party certified and clearly labeled to indicate they meet California's requirements.

CARB regulations apply to hardwood plywood, particleboard, and medium density fiberboard (MDF)

and all products (such as furniture, cabinets, flooring, store fixtures, moldings and millwork, countertops, decorative household items, doors, etc.) made with those products.

Phase I emission requirements were effective beginning January 1, 2009.

8. EPA. U.S. Environmental Protection Agency; www.epa.gov
9. FSC. Forest Stewardship Council; Certified Sustainably Managed Lumber; www.fsc.org;
<http://www.fscus.org/>
 - a. Certifier: Rainforest Alliance 'SmartWood' Program (SW); <http://www.smartwood.org>
 - b. Certifier: Scientific Certification Systems 'Forest Conservation Program' (SCS FCP);
<http://www.scs-certified.com>
 - c. Certifier: Bureau Veritas Certification (BVC); <http://certification.us.bureauveritas.com/>
 - d. Certifier: Price Waterhouse Cooper LLC (PwC);
<http://www.pwc.com/extweb/pwcpublications.nsf/docid/0cca106f2a7b9d5585256fc50051263a>
 - e. Withdrawn Certifier: SGS Systems & Services Certification USA;
http://www.us.sgs.com/forestry_us

NOTE: Key strengths of the FSC network and organization is its transparency and ability to pioneer approaches and adaptations to certification. FSC as a standard is more demanding especially in participatory approaches in forest management planning and in the identification and protection of threatened species. FSC also sets detailed requirements for the timber production methods. FSC is 6 to 12 times more prescriptive than PEFC and has more NGO influence credibility.

The VFF Certified Ecoforestry is equivalent to FSC for Vermont.

PEFC is more rigid towards contractors who are assessed during a group certification when working in certified forests. PEFC group certification is based on a management system that requires internal revisions at the group and local levels. PEFC allows more forest producer influence and is less stringent.

10. [HMA](http://www.hardwoodinfo.com). Hardwood Manufacturers Association; www.hardwoodinfo.com
11. ICC. International Code Council; www.iccsafe.org
12. ICC/ES. International Code Council / Evaluation Service; www.icc-es.org
13. ISO/IEC. International Organization for Standardization, International Electrotechnical Commission; www.iec.ch/
14. [NeLMA](http://www.nelma.org). Northeastern Lumber Manufacturers Association. www.nelma.org
 - a. Standard Grading Rules for Northeastern Lumber 2006
15. NFPA. National Fire Protection Association; www.nfpa.org
16. NHLA. National Hardwood Lumber Association; www.natllhardwood.org
17. NOFMA. National Oak Flooring Manufacturers Association; www.nofma.org
18. NWFA. National Wood Flooring Association; [ww.woodfloors.org](http://www.woodfloors.org)
19. [PEFC](http://www.pefc.org). Programme for the Endorsement of Forest Certification schemes, Geneva-based; [PEFC Annex 4](http://www.pefc.org) Chain of Custody; (SFI, CSA, and ATFS are endorsed by PEFC.)
 - a. Member: [SFI](http://www.sfiprogram.org). Sustainable Forestry Initiative, Washington DC; www.sfiprogram.org
 - b. Member: [ATFS](http://www.treesystem.com). American Tree Farm System Certified; www.treesystem.com
 - c. Member: [CSA](http://www.certifiedwood.com). Canadian Standards Association; <http://certifiedwood.csa.ca>
 - d. Certifier: Bureau Veritas Certification (BVC); <http://certification.us.bureauveritas.com/>
 - e. Certifier: Price Waterhouse Coopers LLC (PwC);
<http://www.pwc.com/extweb/pwcpublications.nsf/docid/0cca106f2a7b9d5585256fc50051263a>
20. SCAQMD. South Coast Air Quality Management District; www.aqmd.gov
21. UL. Underwriters Laboratories Inc.; www.ul.org
22. United States Department of Commerce Standard [PS20](http://www.nist.gov)-99
 - a. Procedures for the Development of Voluntary Product Standards
23. USDA. United States Department of Agriculture
 - a. [North American Hardwoods](http://www.naah.org)

- 24. USGBC. United States Green Building Council; www.usgbc.org
- 25. VFF. Vermont Family Forests; www.familyforests.org
 - a. VFF Certified Ecoforestry; <http://www.familyforests.org/ecoforestry/>

1.3 ADMINISTRATIVE REQUIREMENTS

NOTE: Coordinate and edit to the correct Section number below.

A. Coordination per SECTION 013000 or 013100, and as follows:

- 1. Coordinate certified material chain-of-custody from original material resource to project site.

NOTE: Coordinate and edit to the correct Section number below.

B. Preinstallation Meetings per SECTION 013000 or 013100 and as follows:

- 1. Meeting purpose is to review site conditions, installation procedures, schedules, coordination with other work, blocking requirements, and warranty requirements.

NOTE: Coordinate and edit to the correct Section number below.

C. Sequencing: Per SECTION 010000 or 011100, and SECTION 060530.

NOTE: Coordinate and edit to the correct Section number below.

D. Scheduling: Per SECTION 010000 or 011100, and SECTION 013000 or 013200.

1.4 SUBMITTALS

NOTE: Coordinate and edit to the correct Section number below.

A. Product Data per SECTION 013000 or 013300 and as follows: Submit manufacturer's printed descriptions of materials, components, treatment systems, performance criteria, finishes, fasteners, adhesives, use limitations, recommendations and installation information.

NOTE: Coordinate and edit to the correct Section number below.

B. Shop Drawings per SECTION 013000 or 013300 and as follows: Submit plan drawings showing extent of wood flooring scope, and keyed detail drawings indicating detailed expansion considerations, material transitions, and specific attachment requirements.

NOTE: Coordinate and edit to the correct Section number below.

C. Samples per SECTION 013000 or 013300 and as follows:

- 1. Initial for Selection: Submit printed color charts or sample chains indicating manufacturer's complete range for each type of material finish exposed to view that is not yet selected by Architect or specified.
- 2. Final Selection: Submit 6 inch (150mm) long sample of each different profile (grain and species for clear finishes) with proposed finishes, and fasteners.

D. Quality Assurance Submittals per SECTION 014000 and as follows:

- 1. Certificates: Submit printed certificates or manufacturer's letterhead with manufacturer's signature certifying that each product and/or system meets each regulatory requirement, sustainability characteristic, performance requirement, design criteria, and applicable standard specified.
 - a. Certificates of Grade: Certificate of Inspection for grade marked material by (ALSC) recognized inspection agency

- b. KD Certificates: Kiln-dried moisture content by (ALSC) recognized inspection agency.
2. Test and Evaluation Reports: Submit certified test results by a recognized testing laboratory in accordance with specified test methods for each product and/or system indicating physical, chemical and performance characteristics.
 - a. Indicate fire-retardant-treated wood that complies with building code in effect for Project.
 - b. Rot-resistant preservative-treated wood that complies with codes and standards.
3. Qualification Statements: Submit a letter, on printed letterhead and signed by an officer of the firm, for each listed quality assurance qualification listed, attesting to meeting each requirement called out.

NOTE: Edit LEED Requirements below to suit project.

- E. Sustainable Design (USGBC [LEED®](#)) Submittals: Submit the following in accordance with the requirements of SECTION 018113, LEED REQUIREMENTS:
1. LEED Credit MR, Materials & Resources. Submit in accordance with completed LEED 2009-NC v.3 Submittal Templates, with SECTION 017419, CONSTRUCTION WASTE MANAGEMENT requirements, and other required paperwork as follows:
 - a. MR 5.1: Regional Materials, Regionally Extracted, Processed & Manufactured Products, 10 Percent
 - b. MR 5.2: Regional Materials, Regionally Extracted, Processed & Manufactured Products, 20 Percent
 - 1). Submit product data indicating name of the manufacturer, product cost, distance between the project site and the manufacturer, and the distance between the project site and the extraction site for each raw material
 - c. MR 7: FSC Certified Wood
 - 1). Submit certificates of chain-of-custody signed by manufacturers certifying materials and products specified are made from certified wood obtained from forests certified by a Forest Stewardship Council accredited certification body.
 - 2). Submit evidence sawmill is certified for chain-of-custody by an FSC-accredited certification body.
 2. LEED Credit IEQ, Indoor Environmental Quality. Submit completed LEED 2009-NC v.3 Submittal Templates and required paperwork as follows:
 - a. IEQ 4.1 - Low Emitting Materials, Adhesives & Sealants: VOC Data
 - 1). Submit manufacturers' product data for construction adhesives and sealants, including printed statement of VOC content and MSDS Sheets.
 - 2). Submit manufacturer's certification that products meet the requirements of SCAQMD Rule 1168 in areas where exposure to freeze/thaw conditions and direct exposure to moisture will not occur.
 - 3). Submit manufacturer's certification that products meet the requirements of BAAQMD Regulation 8, Rule 51 for containers larger than 16 oz and with CARB for containers 16 oz or less, for areas where freeze/thaw conditions do exist or direct exposure to moisture can occur.
 - b. IEQ 4.2 - Low Emitting Materials, Paints & Coatings: VOC Data
 - 1). Submit manufacturers' product data for interior paints and coatings, including printed statement of VOC content and MSDS Sheets.
 - 2). Clear wood finishes, floor coatings, stains, sealers, and shellacs applied to interior elements meet the VOC content limit requirements established by SCAQMD Rule 1113, Architectural Coatings, effective January 1, 2004.

NOTE: Coordinate and edit to the correct Section number below.

- F. Closeout Submittals per SECTION 017000 or 017800, unless noted otherwise.
1. Operation and Maintenance Data: Including, but not limited to, methods for maintaining installed products.

2. Executed Warranty Documentation: Manufacturers' material warranties and installers workmanship warranty.
3. Record Documents: Drawings, Specifications, and Product Data.

[NOTE: Edit LEED Requirements below to suit project.](#)

4. Sustainable Design Closeout Documentation: Submit completed USGBC LEED® [Worksheet Templates](#) for the following credits:
 - a. MR 5.1, MR 5.2, MR 7
 - b. IEQ 4.1, IEQ 4.2

1.5 QUALITY ASSURANCE

A. Regulatory Requirements

1. Provide fire retardant treatment which complies with the following regulatory requirements:
 - a. FHA Minimum Property Standard #2600.
 - b. HUD Materials Release 1261.
2. International Organization for Standards (ISO) 14001, 9001, and 9002 compliant.

B. Qualifications:

1. Fabricator / Supplier: A firm capable of providing Third Party Certification that wood materials were legally sourced from sustainably managed forests.
2. Testing Agency: An independent testing agency with the experience and capability to conduct the testing indicated, meeting requirements of ISO/IEC Standard 17025 or ASTM E699 and ASTM E329.

C. Certifications: Wood timber and manufactured wood products shall be sourced from sustainably managed forests as certified by SmartWood (SW), SCS, SGS, BVC, SFI, ATFS, CSA, or VFF, and displaying the FSC, PEFC, PEFC member or VFF label.

[NOTE: Edit sustainability standards and certifications below to suit project.](#)

D. Sustainability Standards and Certifications:

1. Adhesive and Sealant VOC Limits: According to South Coast Air Quality Management District [Rule 1168](#) and [GS-36](#) for aerosols.
2. VOC Limits of Wood Finishes, as tested using U.S. EPA Reference Test Method 24 and as defined by:
 - a. South Coast Air Quality Management District Rules: In areas where exposure to freeze/thaw conditions and direct exposure to moisture will not occur.
 - 1). SCAQMD [Rule 1113](#), Architectural Coatings
 - 2). SCAQMD [Rule 1168](#), Adhesive and Sealant Applications
 - b. Bay Area Air Quality Management District Regulation: For containers larger than 16 oz., for areas where freeze/thaw conditions do exist or direct exposure to moisture can occur.
 - 1). BAAQMD [Regulation 8, Rule 51](#)
 - c. California Air Resources Board: For areas where freeze/thaw conditions do exist or direct exposure to moisture can occur.
 - 1). CARB for containers 16 oz. or less.
 - d. Green Seal Standards:
 - 1). [GS-11](#), Low Odor or Low VOC Paint
 - 2). [GC-03](#), Anti-Corrosive Paints, Second Edition, January 7, 1997
3. Certified Wood Materials: According to [FSC-STD-40-004](#) chain-of-custody requirements.

[NOTE: Coordinate and edit to the correct Section number below.](#)

- E. Field Samples per SECTION 014000: Provide field samples, dry laid, to demonstrate aesthetic effects of materials in the room it is to be installed, assisting the Architect and Owner in making final material selections and joint layouts.

NOTE: Edit size of field sample layout to suit project.

1. Minimum Layout Size: 25 sf (2.3m²)

NOTE: Coordinate and edit to the correct Section number below.

- F. Mockups per SECTION 014000 or 014300, and as follows:

NOTE: Mockups are used to verify selections made under Sample submittals, demonstrate aesthetic effects for selection and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation.

1. Mock-up(s): Build Mock-up in location and size acceptable to design professional of type specified. Demonstrate the anticipated range of materials, workmanship and finish expected.
 - a. Notify design professional seven (7) days in advance of time when mock-up will be installed for approval viewing.
 - b. Obtain approval in writing before commencing work.
 - c. Mock-up (may) (may not) be included as a part of the finished project.
 - d. Protect the approved mock-up during construction period as it will be used as a benchmark to judge the finished installation.

NOTE: Either Field Samples and Mockups above or Prototypes below may satisfy the designer's selection process. Delete the one not selected.

NOTE: Coordinate and edit to the correct Section number below.

- G. Prototypes per SECTION 014000 or 014300, and as follows. Provide materials or assemblies of each unit type for review and approval prior to benchmarking, manufacturing or fabrication production indicating each different:

1. Each different joint connection detail
2. Each different support, and exposed fastener
3. Angles and corners
4. Finishes
5. Special grain patterns, wood color, and acceptable wood defects.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery, Storage and Handling per industry and fabricator guidelines, SECTION 016000, and as follows:

1. Delivery and Acceptance Requirements
 - a. Deliver materials to Project site in an undamaged condition, in original bundles and bearing intact labels.
 - b. Inspect shipped materials on delivery to ensure compliance with requirements of Contract Documents and to ensure that products are undamaged and properly protected.
 - 1). Reject damaged goods, and accept properly ordered, protected and undamaged goods.
 - c. Deliver wood flooring only after major projects, such as dry wall, masonry, door and window work, have been completed, and the installation areas meet ambient requirements.
2. Storage and Handling Requirements

- a. Protect wood materials, products and accessories during shipping, handling, storage and installation from exposure to harmful conditions, soiling, damage, and deterioration including, but not limited to, weather, sudden changes in temperature, direct sunlight, extreme dryness or excessive humidity, standing water, moisture, denting, chipping, gouging, warping, peeling, construction operations, and other damage.
 - 1). Handle items with proper care in proportion to the fragility and hazard of each item and its finished surfaces.
 - 2). Store certified materials separately for auditing.
 - 3). Unload wood flooring only during dry weather.
3. Packaging Waste Management
 - a. Require manufacturers, fabricators, suppliers and shippers to provide least amount of packaging that adequately and properly protects, supports and contains the items shipped, and is reusable, returnable or recyclable.

1.7 WARRANTY

- A. Factory Finish Warranty: Contractor shall provide manufacturer's guarantee against defects in factory finish materials and workmanship for the original owner for a twenty-five (25) year period beginning on the date of Substantial Completion acceptance.

PART 2 - PRODUCTS

2.1 FABRICATORS / SUPPLIERS

GREEN NOTE: For most current list of Vermont FSC Certified Products go to http://www.vtwoodnet.org/certified_wood_sources.html .

- A. List of Fabricator and/or Supplier of **Sustainable VT Wood Flooring:** Subject to compliance with requirements, provide products by one of the following:
 1. Currier Farms Forest Products, Danville, VT; 802.684.8128; SW-COC-1120 C and SCS-COC-001477 E
 2. Lathrop's Maple Supply LLC (Exclusively Vermont Wood Products), Bristol, VT; www.exclusivelyvermont.com

NOTE: Exclusively Vermont Wood Products provides sustainably harvested wood from known local central Vermont sources.

3. Planet Hardwood, St. George, VT; 802.482.4405; www.planethardwood.com

NOTE: Planet Hardwood provides FSC certified sustainably harvested wood from Vermont Family Forest and other sources.

4. Rex Lumber, Arlington, VT, 802.236.0758; www.rexlumber.com; FSC-COC-639
5. TimberKnee Wide Plank Flooring, South Royalton, VT; www.timberknee.com; SW-COC-988
6. Vermont Family Forests, Bristol, VT; 802.453.7728; www.familyforests.org; SCS-COC-001477 D

NOTE: Below see non-Vermont based FSC Certified companies that use northern forest timber.

7. Carlisle Wide Plank Floors, Stoddard, NH; 303.893.3937; [SmartWood Certification](#)
- B. List of VT Fabricator or Supplier of **Salvaged Wood Flooring:** Subject to compliance with requirements, provide products by one of the following:
 1. Vermont Wildwoods (Salvaged Diseased Butternut), Marshfield, VT; www.vermontwildwoods.com

- C. List of Fabricator and/or Supplier of VT Wood Flooring: Subject to compliance with requirements, provide products by one of the following:

NOTE: The list below encompasses local fabricators and suppliers from Vermont who are NOT certified.

1. Dick Walker Sawmill, Etc., Fair Haven, VT; 802.747.7900; www.dickwalkersawmill.com
2. Kerber Farms, Mill & Lumber Co., Guilford, VT; 802.257.0614; Kerbert2000@yahoo.com
3. Mansfield Forest Products, N. Ferrisburg, VT; 802.425.7900; www.mansfieldforest.com
4. Northfield Wood Products, Northfield, VT, 802.485.6411
5. Vermont Hardwoods, Chester, VT; 802.875.2550; www.vfh.us

NOTE: Select one of the two Substitution Limitations listed below.

- D. Substitution Limitations: Manufacturers of equivalent products shall be considered when submitted in accordance with CSI Substitution Request Form 1.5C (During the Bidding Phase) or Form 13.1 (After the Bidding Phase.)

NOTE: Coordinate and edit to the correct Section numbers below.

- E. Substitution Limitations: Manufacturers of equivalent products shall be considered when submitted in accordance with SECTION 013000 or SECTION 013300, and SECTION 016000 or 016200.

- F. Product Options

NOTE: Edit options below to suit project requirements deleting that not chosen. The higher the Janka number the harder and denser the wood.

1. Northern Forest Wood Flooring Species ([Janka Hardness](#) in pounds-force)
 - a. Eastern Hophornbeam (1860)
 - b. Hickory (Pecan) (1820)
 - c. Locust, Black (1700)
 - d. Maple, Sugar (1450)
 - e. Oak, White (1360)
 - f. Ash, White (1320)
 - g. European Beech (1300)
 - h. Oak, Northern Red (1290)
 - i. Yellow Birch (1260)
 - j. White Birch (1210)
 - k. Walnut, Black (1010)
 - l. Cherry, Black (950)
 - m. Maple, Red (950)
 - n. Elm, Slippery (860)
 - o. Elm, American (830)
 - p. Sycamore, American (770)
 - q. Boxelder (720)
 - r. Larch (Tamarack) (590)
 - s. Alder, Red (590)
 - t. Hemlock, Eastern (500)
 - u. Butternut (490)
 - v. Fir, White (480)
 - w. Eastern White Pine (380)
2. Wood Cut or [Saw Pattern](#):
 - a. Plain sawn (flat-sawn or flat-grained)
 - b. Quarter sawn (straight-grained, edge grained or straight-grained)
 - c. Rift sawn

3. Edge:
 - a. Square or straight
 - b. Microbevel
 - c. Tongue and groove (T&G)
4. Dimensions:
 - a. Thickness:
 - 1). Standard 3/4 inch (19mm)
 - 2). 5/8 inch (16mm)
 - 3). 1/2 inch (13mm)
 - 4). 3/8 inch (9.5mm)
 - 5). 5/16 inch (8mm)
 - b. Width:
 - 1). Standard strip 2-1/4 inch (57mm)
 - 2). Plank 5 inches (127mm)
 - 3). Plank inches (mm)
 - c. Lengths:
 - 1). Random 12 to 84 inch
 - 2). Random 12 to 60 inch
 - 3). Random 12 to 48 inch
5. Finish:
 - a. Shop prefinished
 - 1). UV cured Acrylic Urethane
 - a). Acid cure (strong odor)
 - b). Water-based
 - b. Unfinished with field finish
 - 1). Polyurethane. High gloss or matte finish
 - a). Moisture cured
 - b). Penetrating oil modified
 - 2). Aluminum Oxide
 - 3). Epoxy
 - 4). Wax
 - 5). Varnish. Matte or glossy finish
 - 6). Shellac and Lacquer
6. Accessories:
 - a. Underlayment - Acoustic
 - 1). Recycled synthetic fibers
 - 2). Recycled Synthetic fibers composited w/ polyethylene vapor retarder
 - 3). Cork
 - 4). Recycled rubber
 - 5). Recycled rubber and cork composite
 - 6). Wool
 - 7). Wood fiberboard
 - 8). Resilient foam
 - 9). Fabric mesh
 - b. Underlayment - Moisture and Vapor Retarder
 - 1). Polyethylene sheet
 - 2). Asphalt-saturated felt sheet
 - c. Underlayment – Thermal Insulation
 - 1). Cork
 - 2). Wool
 - 3). Wood fiber
 - 4). Composite plywood on polystyrene board
 - d. Radiant-heat system per DIVISION 23, HVAC

RED NOTE: Use engineered wood flooring with radiant heating systems, not solid wood flooring unless you wish to have wood board gaped joints, checks, twisting and/or cupping.

- e. Adhesive:
 - 1). Urethane-based
 - 2). Water-based
 - 3). Acrylic
- f. Wood Trim per SECTION 062003.

2.2 DESCRIPTION

A. Regulatory Requirements

- 1. Fire-Test-Response Characteristics: Provide wood flooring with the following surface-burning characteristics as determined by testing identical products per ASTM E84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - a. Interior Finish: Minimum Class C
 - 1). Flame-Spread Index: Class C Interior Finish 76-200 or less.
 - 2). Smoke-Developed Index: 450 or less.

B. Sustainability Characteristics

- 1. [USGBC](#) LEED Rating: Comply with project requirements intended to achieve the following Rating, as measured and documented according to the USGBC LEED® Green Building [Rating and Version](#) indicated:

NOTE: Each LEED Version requires a different credit total to achieve the desired LEED Rating.

NOTE. Select one of the following Ratings:

- a. Rating: Certified
- b. Rating: Silver
- c. Rating: Gold
- d. Rating: Platinum

NOTE. Select one of the following Versions:

- e. Version: [LEED 2009-NC](#) v. 3 (New Construction)
- f. Version: [LEED 2009-EB](#) v. 3 (Existing Building)
- g. Version: [LEED 2009-CI](#) v. 3 (Commercial Interiors)
- h. Version: [LEED 2009 for Schools](#)
- i. Version: [LEED for Retail](#), v. 2 (July 2008) Draft (Commercial Interiors)
- j. Version: [LEED for Health Care](#)
- 2. Applicable LEED Credits: Performance requirements of the following LEED Categories and Credits apply to this Section and shall be met:
 - a. Materials & Resources (MR) Credits: 5.1, 5.2, 7
 - b. Indoor Environmental Quality (IEQ) Credits: 4.1, 4.2

2.3 PERFORMANCE / DESIGN CRITERIA

A. Performance Capacities

- 1. Wood:
 - a. Surface Burning Characteristics per ASTM E84
 - b. Critical Radiant Flux per ASTM E648
 - c. Formaldehyde Emission per ASTM E1333
 - d. [Janka](#) Relative Species Hardness per ASTM D143 (pound-force)
 - e. Hardness Modulus per ASTM D1037 (psi)
 - f. Movement in service requirement
- 2. NHLA [Grade](#)
 - a. Select

- b. No. 1 common
- c. No. 2 Common
- 3. NeLMA (WWPA) [Grade](#)
 - a. C Select
 - b. D Select
 - c. 2 & Better Commons
 - d. 3 Common
 - e. 4 Common
 - f. 5 Common
 - g. 1A Furniture
 - h. 2A Furniture
 - i. Merchantable
- 4. Moisture Content
 - a. 6 to 9 percent for hardwoods per NHLA
 - b. National Grading Rule:
 - 1). S-GRN (surfaced green)
 - 2). S-DRY (surfaced dry)
 - 3). MC 15 (moisture content 15 percent)
- 5. Factory-applied Finish:
 - a. Taber Abrasion Test per ASTM D4060
 - b. Static Coefficient of Friction per ASTM D2047

B. Design Criteria

- 1. Solid wood grain pattern cut

NOTE: Quarter sawn timber is approx. four times more stable than tangentially sawn timber.

- a. Plain sawn (flat-sawn or flat-grained)
- b. Quarter sawn (straight-grained, edge grained or straight-grained)
- c. Rift sawn
- 2. Wood veneer
 - a. Rotary-cut veneer (peeled)
 - b. Sliced veneer
 - c. Sawn veneer (thick)
- 3. Wood Width: Each floor board over under-floor heating shall be ≤ 4 inches (100mm) wide.

2.4 MATERIALS

A. General:

- 1. Hardwood: Provide solid wood lumber per performance requirements.
 - a. Open Grain "Ring-Porous" Hardwood Species: Elm, oak, and ash have distinct figure and grain patterns.
 - b. Close Grain "Diffuse-Porous" Hardwood Species: Cherry, maple, birch, and yellow poplar have small, dense pores resulting in less distinct figure and grain.
- 2. Softwood: Provide solid wood lumber per performance requirements.

2.5 ACCESSORIES

A. Fasteners: Of appropriate type, length and durability for wood product used to securely fasten to the substrate for the intended life and use of the unit.

- 1. Acceptable wood sheathing subfloor fasteners.
 - a. #9 wood screws, 8d ring shank, screw shank or common nails for 23/32 inch (18mm) thick panels.
 - b. 10d ring shank, screw shank or common nails for thicker panels.

2. Solid wood flooring fasteners
 - a. Blind Nails: Standard 2 inch (51mm) steel cleat nails
 - b. Top Nails: 15 gage steel finish nails
 - c. Blind Staples: Standard 2 inch (51mm) steel staples

B. Adhesives:

1. Wood Flooring Adhesive - General: Formulation that is specifically recommended for indicated use by adhesive manufacturer.
 - a. VOC Requirement:

NOTE: Chose from the following statements and delete that not selected.

- 1). Adhesives shall comply with LEED Credit IEQ 4 requirements
- 2). Adhesives shall have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Urethane-Based Adhesive. Provide one of the following products:
 - a. Bostiks Best
 - b. Mapei
 - c. DriTac
 - d. Sika
3. Water-Based Adhesives:
 - a. Floor Adhesive: DriTac 6200 or Architect acceptable equivalent.
 - b. Floating Floor Adhesives:
 - 1). Titebond Tongue & Groove Flooring Glue
 - 2). Bruce Everseal
 - 3). Khars Landobond

C. Underlayment - Engineered Wood Flooring per SECTION 061603 and as follows:

1. Manufacturer / Product: Huber Engineered Woods LLC / [AdvanTech®](#) Flooring

NOTE: AdvanTech® Flooring is urea-formaldehyde free.

D. Underlayment - Vapor Retarder:

NOTE: Edit the following to suit project requirements and delete that not selected.

1. Polyethylene Sheet per ASTM D4397: Not less than 6.0 mil (0.15mm) sheet thickness
2. Asphalt-Saturated Felt per ASTM D226: Type I, 15#

E. Underlayment - Acoustic: Per SECTION 098000

F. Underlayment - Thermal Insulation: Per SECTION 072000

2.6 ASSEMBLY / FABRICATION

- A. Expansion / Contraction Movement: Assemble wood products using details that allow for expansion and contraction due to the specified range of changes in ambient conditions.

PART 3 - EXECUTION

3.1 FIELD CONDITIONS

- A. Conditions and Measurements: Visit jobsite to verify installation conditions and floor measurements.

NOTE: Coordinate and edit to the correct Section number below.

- B. Ambient Conditions per manufacturer's written recommendations, SECTION 017000 or 017100 or 017116, and as follows:
1. New concrete slabs shall be flat, clean and dry with no installation of materials on top of the slabs until each moisture requirement is met.
 2. Environmental Limitations: Do not deliver or install until building is enclosed, overhead work is complete, wet work is complete, and HVAC system has been fully operating a minimum (1) one week, consistently maintaining temperature and relative humidity at occupancy levels.
 - a. Maintain for space and substrate a min. 65 deg F (18 deg C) to max. 75 deg F (23.9 deg C) temperature prior to, during and after installation.

RED NOTE: Do not use portable heaters.

- b. Maintain 35-60 percent RH from time of delivery acclimation, during and after Installation.
- c. Allow solid wood flooring to acclimate from 3 to 7 days to the conditions in which it will be installed, at or near occupancy levels.
 - 1). Do not proceed with installation until wood flooring and each accessory product is the same temperature as the space where it is to be installed.
- d. Do not proceed with installation until all ambient conditions are met.

NOTE: Hardwood typically expands across its width during the summer as the air becomes more humid and the wood takes in the moisture, and shrinks during the winter when the heating dries out the air and removes moisture from the boards.

3.2 EXAMINATION

NOTE: Coordinate and edit to the correct Section number below.

- A. Examination per SECTION 017000 or 017100 or 017116, and as follows:
1. Acceptance of Conditions: Carefully examine installation areas with Installer present, for compliance with requirements affecting Work performance.
 - a. Verify that field measurements, surfaces, substrates, structural support, tolerances, flatness, levelness, plumbness, humidity, moisture content level, cleanliness and other conditions are as required, and ready to receive Work.
 - 1). Subfloor Flatness tolerance shall not exceed 3/16 inch over 10 feet (4.8mm over 3m) in all directions at any random place on the floor.
 - 2). Subfloor Moisture:
 - a). Wood subfloor shall be between 12 and 14 percent RH.
 - b). Concrete subfloor shall contain not more than 3 lbs. of water/1000 sf. (0.91kg of water/92.9m²) in twenty-four (24) hours.
 - 3). Test wood flooring materials, and every 1,000 sf of subfloor, to verify proper conditions.
 - a). Wood flooring moisture content shall use a wood meter that checks moisture, and specific gravity or denseness to determine actual moisture content level.
 - b). Perform relative humidity (RH) test on subflooring using on site probes per ASTM F2170.
 - c). Perform anhydrous calcium chloride testing per ASTM F1869 on concrete subflooring.
 - d). Do not proceed with installation until difference in RH between subfloor materials and wood finish flooring is less than 4 percent.
 - 4). Monitor and verify proper ambient room humidity and temperature conditions.
 - b. Where wood flooring or new wood panel subfloor is adhesively attached to concrete slabs, verify that slabs are free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond.

- c. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

NOTE: Coordinate and edit to the correct Section numbers below.

- A. Preparation per SECTION 017000 or 017100 or 017123, and as follows:
 1. Clean substrate, scrape or scarify, sweep and vacuum substrate clear of debris, paint, drywall, oily films, soap, wax, silicone, and dust. Do not use solvents.
 2. Layout installation by marking extents of each item, and anchoring / fastening locations coordinated with blocking or other structural support.
 - a. Locate areas not flat within required tolerances and correct.
 - b. Set proud nails or other fasteners into subfloor.
 - c. Secure loose subflooring.
 3. Protect adjacent conditions per SECTION 017000 or 017100, and as follows:
 - a. Protect adjacent substrates, installed work and existing items from damage by construction operations with temporary but effective means.
 - b. Strictly adhering to industry safety requirements.
- B. Acceptable Subflooring
 1. Wood panel sheathing underlayment
 - a. Minimum Thicknesses:
 - 1). 7/8 inch (22mm) thick with 24 inch O.C. supports
 - 2). 3/4 inch (23/32 inch or 18mm) thick with 16 inch O.C. supports
 - 3). 5/8 inch (16mm) thick when laid directly on a structural subfloor
 - b. Panel Types:
 - 1). Engineered Wood Flooring Underlayment: Place 15# felt or red rosin paper overlapping edges 2-4 inches (51mm to 102mm) prior to laying solid wood flooring on engineered flooring underlayment.
 - 2). CDX grade plywood underlayment
 - 3). OSB PS2 rated underlayment
 - c. Fastener Spacing: Wood sheathing subfloor fasteners to be spaced a maximum 6 inches O.C. at supported ends, and 12 inches (305mm) O.C. at intermediate supports.
 - d. Expansion: Provide 1/8 inch (3mm) gap at square-edge butted 4 foot (1.2m) panel ends
 2. Solid Wood Underlayment
 - a. Minimum Thicknesses:
 - 1). 7/8 inch (22mm) thick with 24 inch (610mm) O.C. supports
 - 2). 3/4 inch (23/32 inch or 18mm) thick with 16 inch (406mm) O.C. supports
 3. Screeds over concrete
 - a. Wood 2x4 sleepers laid flat side down 16 inches (406mm) O.C. and fastened to subfloor
 - 1). Wood panel sheathing underlayment on sleepers
 - 2). 3/4 inch (23/32 inch or 18mm) T&G solid wood flooring directly on sleepers
 - b. Cementitious leveling compound over concrete
 4. On-grade Subfloors and Concrete Subfloors: Provide a continuous Class I or Class A moisture retarder (≤ 0.1 perm) per ASTM E1745.
- C. Leveling Concrete Substrate
 1. Clean Subfloor: Scrape or scarify, sweep and vacuum subfloor clear of debris, paint, drywall, and dust.

NOTE: Select the method(s) relevant to the project and delete those not selected.

2. Scarify concrete subfloor with slight changes in flatness using #12 grit rock paper attached to the bottom of a flooring buffer.

3. Grind minor concrete subfloor high spots using a hand held grinder with vacuum attachment.
4. Grind major concrete subfloor conditions using a [Levtec Expander grinder](#) or equivalent. Provide dust curtains and other dust control measures prior to using.
5. Floor Leveling Compound: Provide the proper leveling compound for the conditions as warranted.
 - a. Apply only when substrate and ambient conditions meet all product requirements.

- D. Layout Preparation – Racking: Dry lay out each wood-flooring strip without fastening to account for color and length variations.

3.4 INSTALLATION

NOTE: Coordinate and edit to the correct Section number below.

- A. Installation per manufacturer's written instructions, SECTION 017000 or 017300 or 017316, and the following:

1. General:
 - a. Install solid wood floors by secret nailing or stapling into timber (either an existing floor or battens or sleepers or plywood laid over concrete).

RED NOTE: Glue-down installation of solid wood flooring is not a sustainable method precluding the possibility of salvage and reuse, and possibly negatively affecting IAQ (indoor air quality).

- b. Establish a squareness control line set from the longest parallel wall.
 - 1). Establish transfer control line(s) in adjacent room(s) as necessary.
- c. Begin installation on the longest parallel wall.
- d. Allow for expansion by providing a gap around the floor from 19/32 inch to 25/32 inch (15mm to 20mm). Allow for additional expansion across the width during a winter installation.
- e. Since wood boards more than five times wider than thick are prone to bowing and cupping, each board over 5-1/2 inch (140mm) wide shall be additionally secured across its width either by screwing and pelleting, face nailing or using adhesive on the back of the board.
- f. Wood strip end joints shall be staggered as far away from each other as possible, and no closer than 6 inches (150mm).
 - 1). Exception: With boards shorter than 12 inches (300mm) in length stagger end joints at no less than twice the width of the board.
- g. When backfilling use a snug spline or slip tongue as needed.
- h. Cut wood strips or planks in a dust controlled separate room or area.
2. Installation pattern shall be:

NOTE: Choose from the following patterns, deleting items not selected.

- a. Straight
- b. Random parallel mixture of board widths
- c. Diagonal, 45 degree angle
- d. Parquet, repeated geometric
- e. Herringbone, diagonal zigzag
- f. Perimeter Border or mosaic
3. Hardwood on Concrete
 - a. Moisture Barrier: Lay polyethylene sheet film or asphalt felt on concrete.
 - 1). Spot glue polyethylene sheet with polyurethane-based adhesive.
 - 2). Lap joints a minimum 4 inches (100mm) extending sheet a few inches up the sides of the walls.
 - 3). Glue or tape seal each joint and perimeter edge

NOTE: Choose from one of the following subfloor systems, deleting the ones not selected.

- b. Plywood on Concrete Subfloor: Lay minimum 5/8 inch (9.5mm) CDX plywood underlayment over moisture barrier and attach using concrete cut nails, tapcons (concrete screws), or Hilti type fasteners.
- c. Plywood Floating Subfloor: Lay two-layers, staggered and overlapping, of 1/2 inch (13mm) CDX plywood stapled or screwed together. Note: Do not puncture moisture barrier.
- d. Plywood Glued to Concrete Subfloor: Glue down 5/8 inch (9.5mm) CDX plywood sheets onto concrete using premium urethane adhesive. Kerf cut concrete side of plywood to give it higher flexing capabilities.

NOTE: Choose from the following floor installation methods, deleting the ones not selected.

- 4. Floating Floor Method:
 - a. "Clip" connect each wood flooring strip or plank, milled with bottom-side channels with metal clips.
 - b. "Glue together" by squeezing a bead of glue into the grooves or the top of the tongue of each wood flooring strip or plank, and tap into place with hammer and tapping block.

NOTE: The following floating floor methods are used with engineered wood flooring.

- c. "Click together" each milled T&G wood flooring strip or plank. Tap to click as needed.
 - d. "Lock and fold" each milled T&G wood flooring strip or plank.
- 5. Nail Down Method. Fasten through T&G tongue using:
 - a. Manual cleat nailer.
 - b. Pneumatic or air assisted flooring cleat nailer.
 - c. Pneumatic or air assisted flooring stapler.
 - 1). Skip nailing or fastening every other row is not acceptable.

RED NOTE: Glue Down Method is not recommended but is included for completeness.

- 6. Glue Down Method: Follow glue manufacturer's recommendations.
 - a. Trowel spread adhesive in an area on the subfloor where one can reach to place boards.
 - b. Place each individual board into adhesive until adhesive area is covered. Repeat adhesive spread and board placement until done.
- 7. Site Finishing:
 - a. Top Sanding: Perform using only sanders with a dust control vacuum attachment.
 - 1). Provide effective dust containment system.
 - b. Finish Coating: Stain and clear topcoat per SECTION 099300.

3.5 FIELD QUALITY CONTROL

NOTE: Coordinate and edit to the correct Section number below.

- A. Site Tests and Inspections: Per SECTION 014000 or 014500 or 014523, and as follows:
 - 1. Inspect for buckling, cupping, crowning, and tenting, an indication that a subfloor and wood flooring acclimation period and/or moisture testing limits may not have been met, and/or allowances for expansion and contraction were not observed.
 - 2. Inspect for creaking, popping, squishy, bouncy, or sea saw effects, an indication that the subfloor was not properly prepared, and/or meeting the recommended flatness tolerance.
 - 3. Inspect for gapping due to shrinkage, an indication that the wood flooring may not have met moisture content limits and/or was not properly installed per temperature and RH requirements.
- B. Non-Conforming Work per General Conditions and as follows:
 - 1. Remove, Repair and Reinstall or Restore in Place damaged items.
 - a. Finish touch-up damaged surface finishes.

2. Replace damaged materials or items with New if repair not acceptable to Architect.

3.6 CLEANING

NOTE: Coordinate and edit to the correct Section number below.

- A. Waste Management per SECTION 017000 or 017400 or 017419, and as follows:
 1. Disposal Requirements:
 - a. Handle hazardous waste in strict accordance with manufacturers' recommendations and AHJ rules and regulations for materials regulated under RCRA (Resource Conservation and Recovery Act).
 - b. On-site incineration not allowed.
 2. Coordinate take-back program with manufacturer, if applicable.
 - a. Store and return pallets, containers and packaging to manufacturer or recycler for reuse or recycling.
 - b. Store scrap materials to be returned to manufacturer for recycling into new product.

NOTE: Coordinate and edit to the correct Section number below.

- B. Provide Progress Cleaning per SECTION 017000 or 017400 or 017413, and as follows:
 1. Work Areas: Continuously clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - a. Clean and maintain completed construction until Substantial Completion.
 2. Site: Continuously maintain Project site free of waste materials and debris.

NOTE: Coordinate and edit to the correct Section number below.

- C. Provide Final Cleaning immediately prior to Substantial Completion inspection per SECTION 017000 or 017400 or 017423.

3.7 CLOSEOUT ACTIVITIES

NOTE: Coordinate and edit to the correct Section number below.

- A. Substantial Completion Requirements per SECTION 017000 or 017700.

3.8 PROTECTION

- A. Protect installed work from weather, vandalism and construction operations damage until Final Completion or Owner occupancy, whichever comes first.

END OF SECTION

NOTE: Please contact us with comments, additions and deletions about this GuideSpec so we can make it better.

VERMONT SUSTAINABLE JOBS FUND

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