

I. STRUCTURAL FRAMING

A. The deflection of conventional structural framing, including sawn lumber and timber beams or joists, that supports wood sub-floors under all distributed or concentrated live and dead loads shall not exceed:

1. $1/360$ of the span where a ceramic tile or brick finish is adhered to an underlayment and a structural sub-floor;
2. $1/480$ of the span for spans up to 14 ft. (4.3 m), and no greater than $7/32$ in. (6 mm) for spans over 14 ft. (4.3 m), where a stone finish is adhered to an underlayment and a structural sub-floor.

B. The deflection of engineered wood structural framing, including I-joists, open-web truss joists, composite laminated veneer lumber/ LVL, glue laminated timber/glulam and other engineered wood beams or joists, that supports wood sub-floors under all distributed or concentrated live and dead loads shall not exceed $1/480$ of the span where a ceramic tile or brick finish is adhered to an underlayment installed over a structural sub-floor.

C. The deflection of engineered wood structural framing, including I-joists, open-web truss joists, composite laminated veneer lumber/ LVL, glue laminated timber/glulam and other engineered wood beams or joists, that supports wood sub-floors under all distributed or concentrated live and dead loads shall be determined by a qualified structural design professional where a stone finish is adhered to an underlayment installed over a structural sub-floor.

D. Joist spacing in conventional sawn lumber and engineered wood structural framing systems shall not exceed 16 in. (0.4 m) o.c. However, the actual requirements for the spacing of joists are governed by the thickness and type of the sub-floor panel relative to the joist or beam spacing (see II.B.).

E. The actual weight of materials and construction assemblies, including concentrated dead loads of fixed service and other equipment, shall be utilized as prescribed by state and local building codes to estimate dead loads for the purpose of structural design.

F. The minimum uniformly distributed live load and minimum concentrated live loads, wherever such loads shall occur, shall be provided for as prescribed by state and local building codes.

G. Lateral and other bracing must be constructed as prescribed by code and/or engineered wood manufacturers' literature to achieve specified design deflection values.

II. SUB-FLOOR

A. The deflection of the structural sub-floor panels spanning between structural framing components (beams and joists) shall not exceed:

1. $1/360$ of the span where a ceramic tile or brick finish is directly adhered to the underlayment and sub-floor;
2. $1/480$ of the span for spans up to 14 ft. (4.3 m), and no greater than $7/32$ in. (6 mm) for spans over 14 ft. (4.3 m), where a stone finish is directly adhered to an underlayment and a structural sub-floor.



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B. Thickness of plywood, oriented strand board/OSB or composite/COM-PLY sub-floor panels:

1. 5/8 in. (16 mm) or 19/32 in. (15 mm) thick for 16 in (0.4 m) o.c. joist spacing;
2. 3/4 in. (19 mm) or 23/32 in. (18 mm) thick for up to 24 in. (0.6 m) o.c. joist spacing;
3. for all other structural sub-floor materials, such as wood planks, minimum thickness must be as prescribed by building code and deflection must be verified by a qualified professional to comply with requirements in sections II.A.1. and II.A.2.;
4. sub-floor panels of other thickness with APA-Engineered Wood Association trademark grade span ratings that are commensurate with joist spacing are acceptable.

C. All sub-floor panels must be APA Exterior or Interior Exposure 1 exposure durability with any APA grade designation. APA Sturd-I-Floor performance rated panels are not acceptable for direct adhesive installation of ceramic tile, stone or brick without an underlayment due to moisture expansion of tongue and groove panel edges or by moisture sensitivity of oriented strand board/OSB type APA Sturd-I-Floor.

D. Installation:

1. Face grain across supports;
2. Panel continuous over two or more spans;
3. End joints must occur over framing members;
4. Must be tongue and groove, or if not available, all edges must be blocked;
5. Fasten 6 in. (0.15 m) o.c. along all edges and 8 in. (0.2 m) o.c. in panel field with 8d ring-shank, coated or hot-dip galvanized nails for 5/8 in. (15 mm) and 3/4 in. (19 mm) thick panels or screw them in place;
6. Glue sub-floor panels to joists with construction adhesive to increase stiffness.

III. UNDERLAYMENT

A. The underlayment may not be used in whole or part as a structural panel to achieve minimum deflection requirements of the sub-floor as specified in section II.A.1. but may be used as a structural panel to provide increased stiffness to meet deflection requirements specified in II.A.2.

B. Use APA Exterior structural-use sub-floor panel grade designations A-A, A-B, A-C, B-B, B-C, C-C & C-C Plugged and all Structural I panel grades; Note: interior plywood with exterior glue exposure durability is not acceptable.

C. The minimum recommended thickness for plywood underlayment panels is 5/8 in. (16 mm) or 19/32 in. (15 mm).

D. Mortar beds, cementitious backer units which are approved for direct adhesion of ceramic tile, stone and brick, are acceptable as wood underlayment substitutes - consult manufacturer for guidelines on installation and recommended adhesives (see T.D.S. 2007 for additional information on cementitious backer units).

E. Installation:

1. Protect underlayment from damage or contamination by other trades;
2. Stagger end joints of underlayment panels;
3. Offset joints between underlayment panels from joints between sub-floor panes;
4. Allow minimum 1/8 in. (3mm) between panels and 1/4 in. (6mm) between panel and wall for expansion;

5. Fasten 6 in. (0.15 m) o.c. along all edges and 8 in. (0.2 m) o.c. in both directions in panel field with 8d ring-shank, coated or hot-dip galvanized nails for 5/8 in. (15 mm) and 3/4 in. (19 mm) thick panels or screw them in place;
6. Glue underlayment to sub-floor with construction adhesive to increase stiffness.

IV. INSTALLATION OF CERAMIC TILE, STONE & BRICK

A. Recommended Adhesives:

1. LATAPOXY® 300 Epoxy Adhesive;
2. LATAPOXY210 Modified Epoxy Adhesive;
3. LATICRETE® Floor N' Wall Thin-Set Mortar and LATICRETE 333 Super Flexible Additive;
4. LATICRETE Floor N' Wall Thin-Set Mortar and LATICRETE 101 Rapid-Set Latex Admix;
5. LATICRETE 254 Platinum Multipurpose Thin-Set Mortar.
6. LATICRETE 253 Gold Multipurpose Thin-Set Mortar.

V. LIMITATIONS

A. Engineered wood structural framing may be subject to increased in-service deflection due to moisture exposure and long span conditions.

B. Plywood is not a suitable subsurface for the installation of ceramic tile brick or stone in interior locations where plywood is exposed to excessive moisture or humidity, such as steam rooms, showers, pools, fountains, over damp basements, or for exterior installations.

C. Fire-retardant or preservative treated plywood, masonite, hardwood floors, strip wood floors, "yellow pitch pine" plywood, composite panels, luan, wafer board, particleboard, oriented strand board/OSB, or similar engineered or reconstructed wood panels are not suitable substrates for the direct adhesive installation of ceramic tile, stone or brick. However, some of these materials, such as oriented strand board/OSB or fire retardant plywood, may be used as a structural sub-floor when 1) the material meets sub-floor deflection criteria listed in II.A.1. & II.A.2. of this specification, 2) are identified with an APA trademark as a performance rated structural-use panel, and 3) an underlayment suitable for direct adhesion of ceramic tile, stone or brick is provided over the sub-floor.

D. For interior installations of ceramic tile, stone and brick in wet areas above occupied space, install LATICRETE 9235 Waterproof Membrane to prevent moisture penetration through floor construction to ceiling or occupied spaces below. Please note that this treatment is not designed for exterior roof decks.

Technical Data Sheets are subject to change without notice. For latest revision, check our website @ www.laticrete.com

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