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# 3.2 Material



- a) Materials used for construction of Product covered within the scope of this standard shall adhere to the requirements set forth in the AWI 300 - Materials Standard (latest edition).
- b) Materials used for the same purpose, within the scope of this standard, shall be consistent throughout a project.
- c) Sapwood and other characteristics are permitted where specified.
- d) For all materials selected for the manufacture of Product at transparent finishes:

Premium	Custom	Economy
Sapwood, wormholes, and knots are not permitted	Wormholes not exceeding 1.6 mm [.063"] in diameter are permitted at a	Wormholes not exceeding 1.6 mm [.063"] in diameter are permitted at a

<p>A maximum of two streaks are permitted in any tread provided they do not exceed 4.8 mm [.188"] in width by 152.4 mm [6"] in total combined length</p> <p>Lumber (including block segments or veneer of laminated material) are to be well matched for color and grain; sheet products shall be compatible for color with solid stock, and adjacent sheet products shall be well matched for color and grain</p>	<p>maximum of one per linear 305 mm [12"]</p>	<p>maximum of two per linear 305 mm [12"]</p>
	<p>Permitted natural characteristics shall be filled and sanded prior to finishing</p>	<p>Permitted natural characteristics shall be filled and sanded prior to finishing</p>
	<p>Streaks and sapwood are permitted</p>	<p>Slightly chipped grain, streaks, and sapwood are permitted</p>
	<p>A maximum of one sound-tight knot not exceeding 6.4 mm [.250"] in diameter is permitted per linear 914 mm [36"]</p>	<p>A maximum of one sound-tight knot not exceeding 6.4 mm [.250"] in diameter is permitted per linear 305 mm [12"]</p>
	<p>Material shall be compatible for color and grain</p>	<p>Material shall be at the option of the manufacturer/supplier</p>

e) Materials selected for the manufacture of Product at opaque finishes shall meet requirements set forth in AWI 300 Materials (latest edition).

f) Concealed surfaces shall permit aesthetic defects.

g) Blocking, fillers, and shim stock shall be of sound material.

h) Sealants and/or adhesives shall be compatible for color to adjacent surfaces. Sealants and/or adhesives shall be used in accordance with manufacturer/supplier's documented instructions.

i) All glue seams shall be tight and surface residue shall be completely removed.

j) Where matching of "rustic" styles or finishes and/ or reclaimed materials is specified, number of permitted natural characteristics shall be as agreed to between owner/design professional and manufacturer/supplier.

### 3.2.1 Stairs, Components

#### 3.2.1.1 Exposed Stringers and Skirt Boards

a) Stringers shall be a minimum of 19.1 mm [.750"] thick.

b) At stringers exceeding 4267 mm [168" long, joining for length is permitted. For exceptions, see Exceptions to Material Requirements herein.

c) Wood selected to make up stringers shall be laid up, joined, and glued. Joinery shall be inconspicuous.

d) Individual staves shall have a maximum of one end joint per 7315 mm [288"] and, at edge-glued stock (For exceptions, see Exceptions to Material Requirements herein):

Premium	Custom	Economy
There shall be no more than three staves per 305 mm [12"] in width	There shall be no more than five staves per 305 mm [12"] in width	Stringers shall be made up of staves no less than 50.8 mm [2"] in width
Individual staves shall be well-matched for color and grain	Individual staves shall be compatible for color and grain	Individual staves shall be at the option of the manufacturer/supplier

e) At edge-glued stock, individual staves shall be lap jointed, finger jointed, doweled, or splined to achieve desired length. End joints in staves shall be staggered.

f) At face laminated stringers, exposed plys at the edges shall be of same species. Face butt joints in exposed plys are permitted.

g) At transparent finish, all visible staves shall be of same species or covered with matching veneer.

h) Stringers shall be structurally sound, without splits or checks, and without knots within 50.8 mm [2"] of the edges. This requirement does not apply to non-structural skirt boards.

i) For edge gluing requirements see Exceptions to Material Requirements, Exposed Stringers and Skirt Boards.

### 3.2.1.2 Stringers, Concealed

a) The following materials are permitted:

Premium	Custom	Economy
Engineered Material – glued laminated timber (Glulam), laminated veneer lumber (LVL), parallel strand lumber (PSL)	Engineered Material – glued laminated timber (Glulam), laminated veneer lumber (LVL), parallel strand lumber (PSL)	#1 common structural, fir, hemfir, southern yellow pine (SYP) with no knots within 152.4 mm [6"] of bottom edge

### 3.2.1.3 Treads, Wood

a) Shall be a minimum of 19.1 mm [.750"] thick.

b) At glued-up stock:

Premium	Custom	Economy
Each tread shall consist of no more than three staves per 305 mm [12"] in width	Each tread shall consist of no more than five staves per 305 mm [12"] in width	Number and length of staves shall be at the option of the manufacturer/supplier
Stave end joinery not permitted	Stave end joinery not permitted	Stave end joinery permitted
Individual staves shall be well-matched for color and grain	Individual staves shall be compatible for color and grain	Individual staves shall be compatible for color

c) Joinery shall be inconspicuous.

### 3.2.1.4 Treads, Hybrid

a) Typically made of a solid wood of an economical species, joined by finger joints to a specified exposed wood end and return (See Figure 89).

b) Use of hybrid treads at stairs with a runner or similar detail is permitted.

c) Finger joints in hybrid treads are permitted only in that portion designed to be concealed (See Figure 89).

d) Exposed tread material shall adhere to a minimum of Custom Grade material guidelines.



### 3.2.1.5 Treads, Engineered (Veneered)

a) Shall have balanced veneer faces with a structurally sound substrate a minimum of 25.4 mm [1"] thick.

b) Nosing edge shall be solid material a minimum of 31.75 mm [1.250"] wide and of the same species as veneer.

c) Exposed ends shall be returned with the same species as veneer in order to completely conceal the substrate.

### 3.2.1.6 Treads, Plank (Slab)

a) Defined as any tread 38.1 mm [1.500"] thick or greater.

b) Exposed staves used to make plank treads shall be a minimum of 19.1 mm [.750"] thick and consist of full length staves joined and edge-glued. Joinery shall be inconspicuous.

c) Order and thickness of staves shall be consistent throughout treads, platforms, and landings.

d) Vertical staves or horizontal staves are permitted at manufacturer/supplier's option.

### 3.2.1.7 Treads, Carpet Grade

a) All treads that do not meet the requirements under any other subheading of this standard are considered carpet grade.

b) Shall be a minimum of 19.1 mm [.750"] thick.

c) Shall be solid wood or a minimum of sub-floor grade material that is structurally sound and designed specifically for carpeted applications.

d) OSB treads are permitted, however, their use shall adhere to their intended manufacturing specification (e.g. indoor or outdoor applications).

e) Up to four sound knots, not exceeding 38.1 mm [1.500"] in diameter are permitted at solid wood treads, provided they are not within 50.8 mm [2"] of the nosing edge.

f) Finger joints are permitted.

### 3.2.1.8 Treads, Landing

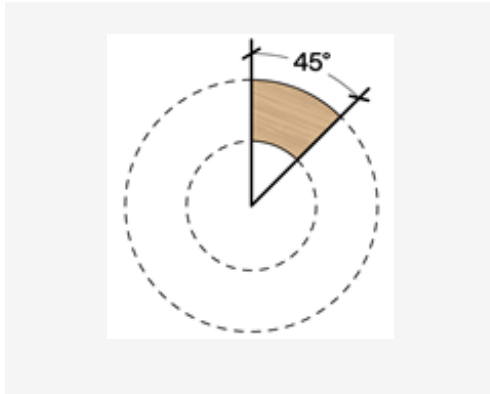
a) Shall be fabricated of the same species as the adjacent treads and shall be:

Premium	Custom	Economy
Well-matched for color and grain to adjacent treads and landing flooring	Compatible for color and grain to adjacent treads and landing flooring	At the option of manufacturer/supplier

b) At the exit of a flight, nosing of the landing tread shall be fabricated to match the thickness, profile, and projection of the nosing of the treads and landings throughout the stairway.

c) At the exit of a flight, shall be set so the top surface is flush with flooring and is securely attached.

d) Curved landing tread (See Figure 90) shall curve no greater than 45 degrees in a single section.



### 3.2.1.9 Treads, Ends

a) At treads, ends shall:

Premium	Custom	Economy
Be returned to match the leading edge of the tread and conceal all exposed end grain, including end grain of the return	Be returned to match the leading edge of the tread and conceal end grain of the tread	Have profiled ends to match the leading edge of the tread

b) At winders in curved stairways shall have:

Premium	Custom	Economy
Both edges concentric with curve of stair	Both edges concentric with curve of stair	Returns at the option of the manufacturer/supplier

### 3.2.1.10 Treads, Curved (Bowed) and Starting Steps

a) Exposed end grain is permitted. Nosing profile shall be consistent.

b) Grain shall be oriented to minimize end grain exposure at the path of travel.

## 3.2.2 Risers

a) Shall be a minimum of:

Premium	Custom	Economy
19.1 mm [.750"] thick	19.1 mm [.750"] thick	12.7 mm [.500"] thick

### 3.2.2.1 Risers, Transparent Finish

a) At transparent finish risers:

Premium	Custom	Economy
Shall have no more than two staves/veneer leaves per riser and shall be well-matched for color and grain.	Shall have no more than three staves/veneer leaves per riser	Shall have no more than four staves/veneer leaves per riser.
Stave riser shall be well matched for color and grain; veneered riser shall be compatible for color and grain with adjacent surfaces within the stair.	Material shall be compatible for color and grain to adjacent surfaces within the stair.	Material shall be at the option of the manufacturer/supplier

b) Joinery shall be inconspicuous.

### 3.2.2.2 Risers, Opaque Finish

a) Edge gluing and finger joints are permitted.

b) Filling and sanding of defects is permitted.

### 3.2.2.3 Risers, Curved (Bowed) or Starting Steps

a) Species shall match in color and grain with risers within the flight per specified grade.

b) Risers at curved or starting steps shall be:

Premium	Custom	Economy
Solid kerfed stock with backer or solid form to maintain radius	Solid kerfed stock or kerfed veneered plywood stock with backer or solid form to maintain radius	Kerfed or bending plywood backer or solid form to maintain radius

### 3.2.3 Platforms and Intermediate Landings

a) Defined as 38.1 mm [1.500"] thick or greater.

b) Exposed staves used to make plank platforms/intermediate landings shall be a minimum of 19.1 mm [.750"] thick and consist of full length staves joined and edge-glued. Joinery shall be inconspicuous.

c) Order and thickness of staves shall be consistent throughout treads, platforms, and landings.

d) Staves shall be face glued or edge glued at manufacturer/supplier's option.

e) Expansion joints shall be used on platforms and intermediate landings to permit expansion and contraction.

### 3.2.4 Winders

a) Grain shall run parallel to leading edge.

b) Shall be of the same material and nosing profile as adjacent treads.

### 3.2.5 Guard and Handrail Components

#### 3.2.5.1 Newels, Transparent Finish

a) Veneered faces are permitted.

b) At solid newels:

Premium	Custom	Economy
Staves shall be a minimum of 25.4 mm [1"] thick and of the same species at newels 95.3 mm [3.75"] or less	Staves shall be a minimum of 19.1 mm [.750"] thick and of the same species at newels 101.6 mm [4"] or less	Staves shall be a minimum of 19.1 mm [.750"] thick and of the same species
Staves shall be a minimum of 31.8 mm [1.25"] thick at newels exceeding 95.3 mm [3.75"] in diameter and be of similar thickness	Staves shall be a minimum of 25.4 mm [1"] thick at newels exceeding 101.6 mm [4"] in diameter	
Edge gluing is not permitted	Edge gluing is permitted at center plys, provided color remains compatible after turning	Edge gluing is permitted at plys, provided color remains compatible after turning
Components shall be well-matched for color and grain	Components shall be compatible for color and grain	Components shall be compatible for color

c) At box (hollow) newels:

Premium	Custom	Economy
Edge gluing of faces is permitted at a maximum of	Edge gluing of faces is permitted at a maximum of	Edge gluing of faces is permitted



two staves per 203 mm [8"] or wider	three staves per 152.4 mm [6"] or wider	
Staves and sides shall be well-matched for color and grain	Staves and sides shall be compatible for color and grain	Staves and sides shall be compatible for color
Corners shall be mitered	Corners shall be mitered or lap jointed at the option of the manufacturer/ supplier	Corners shall be mitered or butted at the option of the manufacturer/ supplier

d) Finger joints are not permitted.

e) Solid squares are permitted if the surface and core moisture content are equal.

f) Stile and rail construction of box newel sides with panels is permitted.

g) Stile and rail construction of box newel sides with panels shall be compatible for color and grain.

### 3.2.5.2 Newels, Opaque Finish

a) At opaque finish newels:

<b>Premium</b>	<b>Custom</b>	<b>Economy</b>
Edge gluing and finger joints are not permitted	Edge gluing and finger joints are permitted	Edge gluing and finger joints are permitted
Filling and sanding of defects is not permitted	Filling and sanding of defects is not permitted	Filling and sanding of defects is permitted

b) Solid squares are permitted if the surface and core moisture content are equal.

c) Stile and rail construction of box newel sides with panels is permitted.

## 3.2.6 Handrails

### 3.2.6.1 Handrails, Straight

a) Shall be laminated to ensure straightness.

b) Glue lines from horizontal plys shall not be visible from the top view of the rail.

c) All visible plys shall be of the same species and grade.

d) At straight handrails:

Premium	Custom	Economy
Rails not exceeding 4724 mm [186"] long shall be all solid plys	The top rail ply not exceeding 3556 mm [140"] long shall be all solid	Finger joints are permitted in the top rail ply at intervals equal to or exceeding 914mm [36"] long
One staggered joint is permitted at the top rail ply exceeding 4724 mm [186"] long	One staggered joint is permitted at the top rail ply exceeding 3556 mm [140"] long	Staggered joints at top rail ply at the option of the manufacturer/supplier
Finger joints and edge gluing are not permitted	Finger joints are permitted at lower plys	Finger joints are permitted at lower plys
Plys shall be well-matched in color	Plys shall be compatible for color	Color of plys shall be at the option of the manufacturer/supplier

e) For individual material lengths by species, see Exceptions to Material Requirements herein.

### 3.2.6.2 Curved Handrails, Bending

a) Bending rails composed of vertical or horizontal plys are permitted. Number of plys is dependent on the radius, height, and width of the rail.

Material shall be:

Premium	Custom	Economy
Well-matched for color and grain	Compatible for color and grain	Compatible for color

c) Lamination prior to resawing and profiling is permitted.

d) Finger joints are permitted:

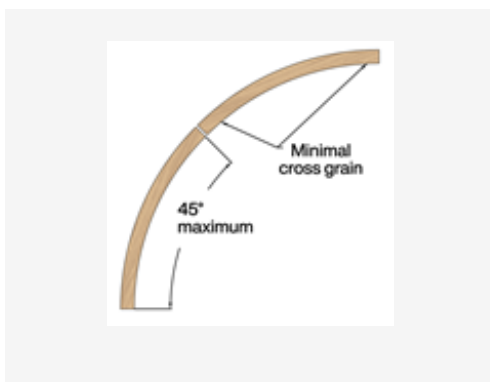
Premium	Custom	Economy
At a maximum of one per each ply at vertical plys exceeding 4724 mm [186"] long	At a maximum of one per each ply at vertical plys exceeding 3556 mm [140"] long	At the option of the manufacturer/supplier

e) For individual material lengths by species, see Exceptions to Material Requirements herein.

f) At outside vertical plys exceeding 4724 mm [186"] long, scarf joints are permitted.

### 3.2.6.3 Curved Handrails, Cut from Solid Blocks

- a) Curved level rail shall be laminated with a minimum of 19.1 mm [.750"] thick plys.
- b) Individual segments that make up curved level rail segments shall be 45 degrees or less (See Figure 91).
- c) Solid stock or glued up block components shall be furnished in such sections as to avoid pronounced cross grain and reduce joints to a minimum.
- d) Curved rake rail shall have a minimum of 34.9 mm [1.375"] thick plys. No more than four plys are permitted to be visible on a section of rail.



### 3.2.7 Rail and Fitting Connections

- a) Shall be of same species.
- b) Shall be joined with glue and concealed hardware.

### 3.2.8 Tolerances

- a) Factory machining tolerances for profiles of mating components shall not exceed .8 mm [.031"].

### 3.2.9 Fittings

- a) Finger joints are:

Premium	Custom	Economy
Not permitted	Not permitted	Permitted at lower plys of vertical drops of goosenecks

- b) Materials shall be furnished in such sections as to avoid pronounced cross grain and reduce joints to a minimum (See Figure 90 and Figure 92).

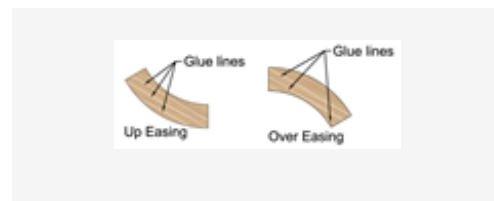
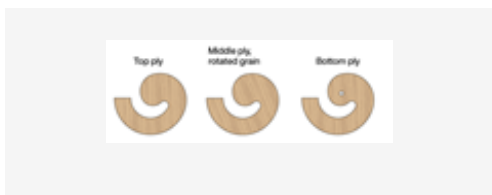
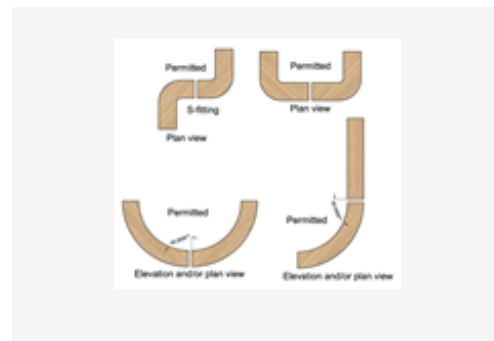
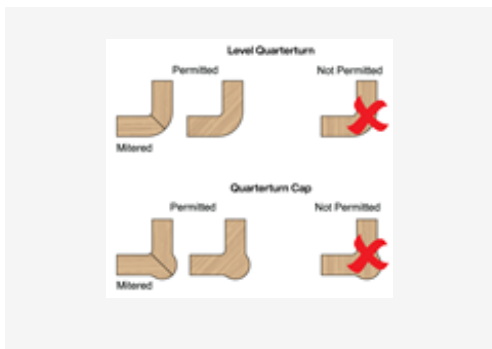
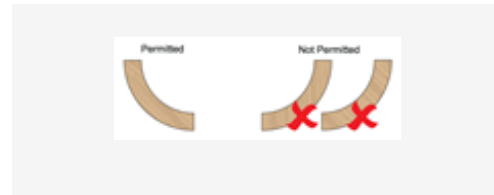
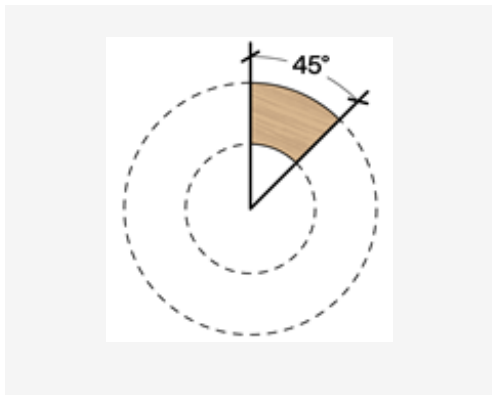
c) Grain shall be no greater than 45 degrees perpendicular to adjoining rails (See Figure 92 and Figure 94).

d) At fittings turning over 45 degrees, miter joints are permitted (See Figure 93).

e) At volutes and turnouts, grain orientation of center ply shall be rotated slightly relative to top and bottom plies to minimize short grain instability (See Figure 95).

f) Easings shall have a ply thickness to prevent exposure of glue lines at the top of the rail (See Figure 96).

g) Wreathed transitions shall have a minimum of 34.9 mm [1.375"] thick plies.



### 3.2.10 Guard In-Fill

#### 3.2.10.1 Wood Balusters, Transparent Finish

a) At transparent finish wood balusters:

Premium	Custom	Economy
Components shall be	Components shall be	Components shall be

composed of one solid piece where not exceeding 50.8 mm [2"] thick	composed of one solid piece where not exceeding 44.5 mm [1.750"] thick	composed of one solid piece where not exceeding 31.8 mm [1.250"] thick
Turned and flat sections shall be sanded prior to finishing	Turned and flat sections shall be sanded prior to finishing	Sanding shall be at the option of the manufacturer/supplier

### 3.2.10.2 Wood Balusters, Opaque Finish

a) Glued up squares are permitted and:

Premium	Custom	Economy
Finger joints are not permitted	Staggered finger joints are permitted	Staggered finger joints are permitted

### 3.2.10.3 Wood, Other Wood In-Fill

a) Wood in-fill shall be compatible with design and specification of other components within guard and stair systems. Species specification shall be in accordance with AWI 300 – Materials Standard (latest edition).

### 3.2.10.4 Balusters, Metal

a) Shall be:

Premium	Custom	Economy
Solid bar construction or a hollow tube with wall thickness of a minimum of 1.2 mm [.047"]	Solid bar construction or a hollow tube with wall thickness of a minimum of 1.2 mm [.047"]	Hollow bar construction with wall thickness between 1.2 mm [.047"] and .8 mm [.031"]

### 3.2.10.5 Cable Rail Systems

a) Components shall be of material appropriate to their intended application (i.e. of the correct material or alloy). If stainless steel is used as a part of cable rail systems, a minimum of type 304 is required.

b) Components in direct contact with one another shall be of the same material to prevent galvanic corrosion.

c) The parts and materials in the cable rail system shall be consistent throughout the project to ensure adherence to mechanical requirements and design intent.

d) Cable strand count and configuration shall allow for manufacturer/supplier's recommended tensioning without undue stretching and sagging.

### 3.2.10.6 Glass In-Fill

a) Glass used for in-fill shall be in accordance with ANSI Z97.1 (latest edition) and ASTM C1036 (latest edition) Standard Specification for Flat Glass.

b) All glass in a stair system shall be made using the same manufacturing process and from the same batch, whenever possible, to prevent differences in color and clarity.

c) All edge treatments and polishing of glass panels shall be consistent throughout the stair system.

d) Glass mounting systems using metal to metal connections (i.e. glass clamps with metal posts) shall be of the same material to prevent galvanic corrosion.

e) Material used for mounting glass panels shall be appropriate for the intended application (i.e. indoor vs outdoor or wood mount vs concrete)

### 3.2.10.7 Metal In-Fill

a) Shall be compatible with other components within the guard system.

## 3.2.11 Well-Hole Trim

a) Material, such as nosing, fascia, scotia, curbing, caps, and shoe rail shall be compatible with other materials used in the stair and guard systems.

### 3.2.11.1 Nosing, Well-Hole

a) Well-hole nosing shall be made of the same species as the adjacent treads, and/ or landing tread.

b) Well-hole nosing shall be made to match the thickness, profile, and projection of the treads and/or landing tread throughout the stair.

c) Curved well-hole nosing shall curve no greater than 45 degrees in a single section.

d) Curved well-hole nosing shall be furnished in such sections as to avoid pronounced cross grain and reduce joints to a minimum.

e) Material for well-hole nosing shall be:

**Premium**

**Custom**

**Economy**

Well-matched for color and grain to adjacent treads and landing tread

Compatible for color and grain to adjacent treads and landing tread

At the option of manufacturer/supplier

## 3.1 General

## 3.3 Structural

571-323-3636

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