



City/County of [NAME OF CITY]
LARUCP INFORMATION BULLETIN ST-01



Design Limitation For Wood Shear Wall

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The purpose of this Informational Bulletin is to alert designers of the specific modifications that the City/County of [NAME OF CITY], in cooperation with major jurisdictions within the Los Angeles region, has made to the 2007 California Building Code relating to the design of light-framed walls with shear panels. The lessons learned from the 1994 Northridge Earthquake have been refined with studies and tests that continued since the last code adoption cycle. The results of these studies and tests necessitate the adoption of further amendments to the structural requirement of the building code. Therefore, LARUCP 23-04 and 23-05 of the 2007 LARUCP Structural Amendments place certain design and construction limits on structural wood panel shear walls and shear walls sheathed with other materials. These design limitation are intended to improve the quality of construction and performance of structures to assure that new buildings and additions or alterations to existing buildings are designed and constructed to resist the hazards of future earthquakes.

2007 LARUCP 23-04. Sections 2306.4.1 and Table 2306.4.1 of the 2007 California Building Code are amended to read as follows:

2306.4.1. Wood structural panel shear walls. The allowable shear capacities for wood structural panel shear walls shall be in accordance with Table 2306.4.1. These capacities are permitted to be increased 40 percent for wind design. Wood shear walls shall be constructed of wood structural panels and not less than 4 feet by 8 feet (1219 mm by 2438 mm), except at boundaries and at changes in framing. Wood structural panel thickness for shear walls shall not be less than 3/8 inch thick and studs shall not be spaced at more than 16 inches on center.

The maximum allowable shear value for three-ply plywood resisting seismic forces is 200 pounds per foot (2.92 kN/m). Nails shall be placed not less than 1/2 inch (12.7 mm) in from the panel edges and not less than 3/8 inch (9.5mm) from the edge of the connecting members for shear greater than 350 pounds per foot (5.11kN/m). Nails shall be placed not less than 3/8 inch (9.5 mm) from panel edges and not less than 1/4 inch (6.4 mm) from the edge of the connecting members for shears of 350 pounds per foot (5.11kN/m) or less.

Wood structural panel shear walls using staples as fasteners shall not be permitted for structures assigned to Seismic Design Category D, E, or F.

Exception: Staples may be used for wood structural panel shear walls when the allowable shear values are substantiated by cyclic testing and approved by the building official.

Any wood structural panel sheathing used for diaphragms and shear walls that are part of the seismic-force-resisting system shall be applied directly to framing members.

Exception: Wood structural panel sheathing in a horizontal diaphragm is permitted to be fastened over solid lumber planking or laminated decking, provided the panel joints and lumber planking or laminated decking joints do not coincide.

Delete Table 2306.4.1 of the 2007 California Building Code and replace with the following:

See page 3 of this Information Bulletin for new Table 2306.4.1.

2007 LARUCP 23-05. Section 2306.4.5 and Table 2306.4.5 of the 2007 California Building Code is amended to read as follows:

2306.4.5 Shear walls sheathed with other materials. Shear wall capacities for walls sheathed with lath, plaster or gypsum board shall be in accordance with Table 2306.4.5. Shear walls sheathed with lath, plaster or gypsum board shall be constructed in accordance with Chapter 25 and Section 2306.4.5.1. Walls resisting seismic loads shall be subject to the limitations in Section 12.2.1 of ASCE 7. The allowable shear values shown in Table 2306.4.5 for material in Category 1 is limited to 90 pound per foot (1.31 kN/m); materials in Category 2 thru 4 are limited to 30 pound per foot (438 N/m). Shear walls sheathed with lath, plaster or gypsum board shall not be used below the top level in a multi-level building.

Shear walls sheathed with other materials using staples as fasteners shall not be permitted for structures assigned to Seismic Design Category D, E, or F.

Exception: Staples may be used for shear walls sheathed with other materials when the allowable shear values are substantiated by cyclic testing and approved by the building official.

Delete Table 2306.4.5 of the 2007 California Building Code and replace with the following:

See page 4 of this Information Bulletin for new Table 2306.4.5.

NOTE: Pursuant to Section 2305.3.1, shear wall sheathing other than wood structural panels shall not be permitted in Seismic Design Category E or F.

**TABLE 2306.4.1
ALLOWABLE SHEAR (POUNDS PER FOOT) FOR WOOD STRUCTURAL PANEL SHEAR WALLS WITH
FRAMING OF DOUGLAS FIR-LARCH OR SOUTHERN PINE^a FOR WIND OR SEISMIC LOADING^{b, h, i, j, l, m, n}**

PANEL GRADE	MINIMUM NOMINAL PANEL THICKNESS (inch)	MINIMUM FASTENER PENETRATION IN FRAMING (inches)	ALLOWABLE SHEAR VALUE FOR SEISMIC FORCES PANELS APPLIED DIRECTLY TO FRAMING				ALLOWABLE SHEAR VALUE FOR WIND FORCES PANELS APPLIED DIRECTLY TO FRAMING					
			NAIL (common) size	Fastener spacing at panel edges (inches)				NAIL (common) size	Fastener spacing at panel edges (inches)			
				6	4	3	2 ^e		6	4	3	2 ^e
Structural I Sheathing	3/8	1-3/8	8d (2½"x0.131" common)	200	200	200	200	8d (2½"x0.131" common)	230 ^d	360 ^d	460 ^d	610 ^d
	7/16	1-3/8	8d (2½"x0.131" common)	255	395	505	670	8d (2½"x0.131" common)	255 ^d	395 ^d	505 ^d	670 ^d
	15/32	1-3/8	8d (2½"x0.131" common)	280	430	550	730	8d (2½"x0.131" common)	280	430	550	730
1-1/2		10d (3"x0.148" common)	340	510	665 ^f	870	10d (3"x0.148" common)	340	510	665 ^f	870	
Sheathing, plywood siding ^g except Group 5 Species	3/8	1-1/4	6d (2"x0.113" common)	200	200	200	200	6d (2"x0.113" common)	200	300	390	510
		1-3/8	8d (2½"x0.131" common)	200	200	200	200	8d (2½"x0.131" common)	220 ^d	320 ^d	410 ^d	530 ^d
	7/16	1-3/8	8d (2½"x0.131" common)	240	350	450	585	8d (2½"x0.131" common)	240 ^d	350 ^d	450 ^d	585 ^d
	15/32	1-3/8	8d (2½"x0.131" common)	260	380	490	640	8d (2½"x0.131" common)	260	380	490	640
		1-1/2	10d (3"x0.148" common)	310	460	600 ^f	770	10d (3"x0.148" common)	310	460	600 ^f	770
	19/32	1-1/2	10d (3"x0.148" common)	340	510	665 ^f	870	10d (3"x0.148" common)	340	510	665 ^f	870
				Nail Size (galvanized casing)					Nail Size (galvanized casing)			
3/8	1-3/8		8d (2½"x0.113")	160	200	200	200	8d (2½"x0.113")	160	240	310	410

For SI: 1 inch = 25.4 mm, 1 foot = 25.4 mm, 1 pound per foot = 14.5939 N/m.

- For framing of other species: (1) Find specific gravity for species of lumber in AF&PA NDS. (3) For nails find shear value from table above for nail size for actual grade and multiply value by the following adjustment factor: Specific Gravity Adjustment Factor = [1-(0.5-SG)], where SG = Specific Gravity of the framing lumber. This adjustment factor shall not be greater than 1.
- Panel edges backed with 2-inch nominal or thicker framing. Install panels either horizontally or vertically. Space fasteners maximum 6 inches on center along intermediate framing members for 3/8-inch and 7/16-inch panels installed on studs spaced 24 inches on center. For other conditions and panel thickness, space fasteners maximum 12 inches on center on intermediate supports.
- 3/8-inch panel thickness or siding with a span rating of 16 inches on center is the minimum recommended where applied direct to framing as exterior siding.
- Allowable shear values are permitted to be increased to values shown for 15/32-inch sheathing with same nailing provided (a) studs are spaced a maximum of 16 inches on center, or (b) panels are applied with long dimension across studs.
- Framing at adjoining panel edges shall be 3 inches nominal or thicker, and nails shall be staggered where nails are spaced 2 inches on center.
- Framing at adjoining panel edges shall be 3 inches nominal or thicker, and nails shall be staggered where both of the following conditions are met: (1) 10d (3"x0.148") nails having penetration into framing of more than 1-1/2 inches and (2) nails are spaced 3 inches on center.
- Values apply to all-veneer plywood. Thickness at point of fastening on panel edges governs shear values.
- Where panels applied on both faces of a wall and nail spacing is less than 6 inches o.c. on either side, panel joints shall be offset to fall on different framing members, or framing shall be 3-inch nominal or thicker at adjoining panel edges and nails on each side shall be staggered.
- In Seismic Design Category D, E or F, where shear design values exceed 350 pounds per linear foot, all framing members receiving edge nailing from abutting panels shall not be less than a single 3-inch nominal member, or two 2-inch nominal members fastened together in accordance with Section 2306.1 to transfer the design shear value between framing members. Wood structural panel joint and sill plate nailing shall be staggered in all cases. See Section 2305.3.11 for sill plate size and anchorage requirements.
- Galvanized nails shall be hot dipped or tumbled.
- Not adopted.
- For shear loads of normal or permanent load duration as defined by the AF&PA NDS, the values in the table above shall be multiplied by 0.63 or 0.56, respectively.
- [DSA-SS & OSHPD 1, 2 and 4] Refer to Section 2305.2.4.2, which requires any wood structural panel sheathing used for diaphragms and shear walls that are part of the seismic-force-resisting system to be applied directly to framing members.
- The maximum allowable shear value for three-ply plywood resisting seismic forces is 200 pounds per foot (2.92 kn/m)

**TABLE 2306.4.5
ALLOWABLE SHEAR FOR WIND OR SEISMIC FORCES FOR SHEAR WALLS OF LATH
AND PLASTER OR GYPSUM BOARD WOOD FRAMED WALL ASSEMBLIES**

TYPE OF MATERIAL	THICKNESS OF MATERIAL	WALL CONSTRUCTION	FASTENER SPACING ^b MAXIMUM (inches)	SHEAR VALUE ^{a,e} (plf)		MINIMUM FASTENER SIZE ^{c,d,j,k,l}	
				Seismic	Wind		
1. Expanded metal, or woven wire lath and portland cement plaster	7/8"	Unblocked	6	90	180	No. 11 gage, 1-1/2" long, 7/16" head	
2. Gypsum lath, plain or perforated	3/8" lath and 1/2" plaster	Unblocked	5	30	100	No. 13 gage, 1-1/8" long, 19/64" head, plasterboard nail 0.120" Nail, min. 3/8" head, 1-1/4" long	
3. Gypsum sheathing	1/2" x 2' x 8'	Unblocked	4	30	75	No. 11 gage, 1-3/4" long, 7/16" head, diamond-point, galvanized	
	1/2" x 4'	Blocked ^f Unblocked	4 7	30 30	175 100		
	5/8" x 4'	Blocked	4" edge/ 7" field	30	200	6d galvanized 0.120" Nail, min. 3/8" head, 1-3/4" long	
4. Gypsum board, gypsum veneer base or water-resistant gypsum backing board	1/2"	Unblocked ^f	7	30	75	5d cooler (1-5/8" lx 0.086") or wallboard 0.120" Nail, min. 3/8" head, 1-1/2" long	
		Unblocked ^f	4	30	110		
		Unblocked	7	30	100		
		Unblocked	4	30	125		
		Blocked ^g	7	30	125		
		Blocked ^g	4	30	150		
	5/8"	Unblocked	8/12 ^h	30	60	No. 6- 1-1/4" screws ⁱ	
		Blocked ^g	4/16 ^h	30	160		
		Blocked ^g	4/12 ^h	30	155		
		Blocked ^{f,g}	8/12 ^h	30	70		
		Blocked ^g	6/12 ^h	30	90		
		Unblocked ^f	7	30	115		6d cooler (1-7/8" x 0.092") or wallboard 0.120" Nail, min. 3/8" head, 1-3/4" long
			4	30	145		
Blocked ^g	7		30	145			
	4		30	175			
Blocked ^g Two ply	Base ply: 9 Face ply: 7	30	250	Base ply-6d cooler (1-7/8" x 0.092") or wallboard 1-3/4" x 0.120" Nail, min. 3/8" head Face ply-8d cooler (2-3/8" x 0.113") or wallboard 0.120" Nail, min. 3/8" head, 2-3/8" long			
	Unblocked	8/12 ^h	30	70	No. 6- 1-1/4" screws ⁱ		
	Blocked ^g	8/12 ^h	30	90			

See page 5 of this Information Bulletin for Footnote to Table 2306.4.5.

Table 2306.4.5 Footnote:

For SI: 1 inch = 25.4 mm, 1 foot = 25.4 mm, 1 pound per foot = 14.5939 N/m.

- a. These shear walls shall not be used to resist loads imposed by masonry or concrete construction (see Section 2305.1.5). Values shown are for short-term loading due to wind or seismic loading. Walls resisting seismic loads shall be subject to the limitations in Section 12.2.1 of ASCE 7. Values shown shall be reduced 25 percent for normal loading.
- b. Applies to fasteners at studs, top and bottom plates and blocking.
- c. Alternate fasteners are permitted to be used if their dimensions are not less than the specified dimensions. Drywall screws are permitted to substitute for the 5d (1-5/8" x 0.086"), and 6d (1-7/8" x 0.092")(cooler) nails listed above, and No. 6 1-1/4 inch Type S or W screws for 6d (1-7/8" x 0.092")(cooler) nails.
- d. For properties of cooler nails, see ASTM C 514.
- e. Except as noted, shear values are based on maximum framing spacing of 16 inches on center.
- f. Maximum framing spacing of 24 inches on center.
- g. All edges are blocked, and edge fastening is provided at all supports and all panel edges.
- h. First number denotes fastener spacing at the edges; second number denotes fastener spacing at intermediate framing members.
- i. Screws are Type W or S.
- j. *Not adopted.*
- k. *Not adopted.*
- l. *This construction shall not be used below the top level of wood construction in a multi-level building.*