

ZIP System® R-Sheathing in Seismic Controlled Regions

ZIP System® R-sheathing is code recognized under ICC-ES ESR-3373 and IAPMO ER-482 as a combination wood structural panel, water-resistive barrier, air barrier and exterior foam insulation when fastened and installed in accordance with Huber Engineered Woods' installation instructions. ZIP System R-Sheathing panels may be used to resist lateral shear forces by prescriptive or engineered methods in accordance with the International Building and Residential Codes. The goal of this Tech Tip is to clarify which evaluation report is applicable to a project based on the Seismic Design Category. There are different Seismic Design Categories based on geographical regions.

ZIP System R-sheathing panels installed in accordance with Table 1 in ESR-3373 and ER-482 complies with the WSP bracing method per the 2009, 2012, 2015, and 2018 IRC as an equivalent alternative to the prescribed wood structural panels. ICC-ES ESR-3373 was the first evaluation report for ZIP System R-sheathings and evaluates structural, thermal resistance, air leakage and weather resistance properties. However, the scope of ESR-3373 was limited to structural use in Seismic Design Categories A, B and C per section 4.6 of ESR-3373. The scope of ER-482 was expanded to allow ZIP System R-sheathing to be recognized structurally in Seismic Design Categories C, D₀, D₁, D₂ and E per section 3.2 of ER-482. When ER-482 is the governing code evaluation use the thermal resistance, air leakage and weather resistance properties listed in ESR-3373.

When designing shear walls in accordance with ESR-3373 (Seismic Design Categories A, B and C) the **allowable** shear capacity for seismic conditions is posted in Table 2, but when designing wind controlled projects a 40% increase to the posted **allowable** shear capacity can be applied per footnote 6 under Table 2.

If using ER-482 (Seismic Design Categories C, D₀, D₁, D₂ and E) it is important to note the **ultimate** shear values are posted for both seismic and wind in separate tables.

The difference between the allowable shear capacity and ultimate shear capacity is described below.

Ultimate Shear Capacity: ultimate shear capacity is the point at which a material can no longer resist shear forces and then failure of the material will occur.

NOTE: Appropriate safety factors must be applied to the ultimate shear capacity. Please check the NDS or governing design standard for all applicable safety factors.

Allowable Shear Capacity: allowable shear capacity takes the ultimate shear capacity and applies a safety factor equal to or greater than one. The most common safety factor applied to wood structural panels is 2. Therefore, the allowable shear capacity for a wood structural panel is typically ½ of the ultimate shear capacity.

The following simplified summary table was created due to the differences in how shear capacities are presented in ESR-3373 and ER-482.

Combined Chart

ZIP System® R-sheathing Type ⁵	Framing ⁴		Fasteners			Shear Values	
	Nominal Stud Spacing (min.)	Maximum Stud Spacing (in.)	Fastener Specifications ⁶	Edge/Field Spacing (in.)	Minimum Penetration into Framing (in.)	Allowable Seismic Controlled Shear Values ^{7, 9, 10} (plf)	Allowable Wind Controlled Shear Values ^{2, 7, 9} (plf)
R-3	2-by-4	24	0.131" shank nails	4/12	1.5	245	343
R-3	2-by-4	24	0.131" shank nails	3/12	1.5	280	393
R-3	2-by-4	16	16ga staples, 7/16" crown, 2" length	3/6	1	210	294
R-6	2-by-4	24	0.131" shank nails	4/12	1.5	230	322
R-6	2-by-4	24	15ga staples, 7/16" crown, 2.5" length	3/6	1	NA ⁸	NA
R-6	2-by-4	24	0.131" shank nails	3/12	1.5	255	357
R-9	2-by-4	24	0.131" shank nails	3/12	1.5	240	336
R-12	2-by-4	24	0.131" shank nails	3/12	1.5	215	301

For SI: Inch = 25.4mm; 1 pound per foot (ppf) = 14.59 N/m.

- 1 Prescriptive bracing requirements with Douglas Fir-Larch Framing under the 2015, 2012 and 2009 IRC.
- 2 Not approved for use as prescriptive wall bracing where the design wind speed is greater than 110mph.
- 3 Engineered shear wall requirements with Douglas Fir-Larch Framing under the 2015, 2012, and 2009 IBC.
- 4 For framing with other than Douglas Fir-Larch, the shear value above must be multiplied by the Specific Gravity Adjustment Factor = [1 - (0.50 - SG)], where SG=Specific Gravity of the framing lumber in accordance with the ANSI/AWC NDS. This adjustment factor must not be greater than 1.
- 5 Type R-3 R-sheathing panels have a foam plastic insulation thickness of .5". Type R-6 R-sheathing panels have a foam plastic insulation thickness of 1". R-9 R-sheathing panels have a foam plastic insulation thickness of 1.5". Type R-12 R-sheathing panels have a foam plastic insulation thickness of 2".
- 6 Fasteners must be common nails or equivalent, or staples, of a type generally used to attach wood sheathing.
- 7 The shear walls must have a maximum height-to-width aspect ratio of 2:1.
- 8 This panel and fastening configuration is only applicable to the prescriptive bracing requirements under the 2015 IRC.
9. All panel edges must be backed by framing
10. ZIP System R-sheathing used as the lateral resistance system in seismic zones C, D₀, D₁, D₂ and E should be designed in accordance to ER-482.

Please visit zipsystem.com or contact our technical department at 800-933-9220 Ext 2716 or at techquestions@huber.com with any questions or comments.