

ALTERNATIVE WIND UPLIFT RESTRAINT SYSTEM

The use of continuous rod, bearing plates, coupler nuts and anchors are an alternative method used to transfer wind uplift forces from the double top plates directly into the foundation providing a continuous load path within the wall system. It is recommended for multiple-story systems to compensate for wood shrinkage and settlement due to dead load through the use of a take-up device. Simpson Strong-Tie offers STU^{1/2} for 1/2" rods or the ATUD5 for rods up to 3/8" diameter. These devices are specially designed to take-up when shrinkage or compression occurs in the wall. The use of the ATUD5 or STU^{1/2} will ensure that when uplift occurs, the system is ready to perform without excessive deflection which can cause failures in other components of the wall. The following tables list the allowable loads for the components to be used in designing with this product. Listed below are other considerations which shall be accounted for in the design of this restraint method:

- The Designer shall determine the spacing of the rods based on the applied roof uplift forces as well as the effects of the double top plate in bending, rod capacity, bearing plate capacity and anchorage. Special considerations shall be made at top plate splices to control the bending (*independently of existing wall sheathing fasteners*). Full scale wind uplift testing at Simpson Strong-Tie, refer to flier F-TIEDOWNSPCE, indicates that spacing of any continuous rod system (*regardless of the manufacturer*) should never exceed 4 feet on center, in wind speeds greater than 110 mph, without additional top plate reinforcement. In some cases further reduced spacing may be required.
- Traditional connections or larger diameter rods and bearing plates may be required at the end of wall openings where the wind uplift is accumulated.
- Shearwall overturning uplift forces are often much greater than wind uplift. Overturning restraint devices at shearwall ends shall be specified by the Designer separately. The shearwall anchoring device shall be designed to resist roof uplift and overturning where the shearwall ends at a corner or adjacent to window or door openings. Consider Simpson Strong-Tie® Anchor Tiedown System (ATS) to restrain shearwall overturning or combined wind uplift and overturning as required (*see catalog C-ATS*).
- The Designer shall check rod deflection under the demand loads and reduce the rod spacing or increase rod diameters as necessary.
- The wind uplift anchors may be used to transfer shear at the sill as well as uplift provided the unity equation is checked as noted in the table. For those applications, it is recommended that a bearing plate and nut be used to restrain the sill plate.
- Anchor allowable loads listed below are based on a minimum spacing of anchors equal to twice the embedment depth. The loads shall be adjusted for two runs spaced at less than the minimum spacing.

These products are available with additional corrosion protection. Additional products on this page may also be available with this option, check with Simpson Strong-Tie for details.

Bearing Plate Capacity

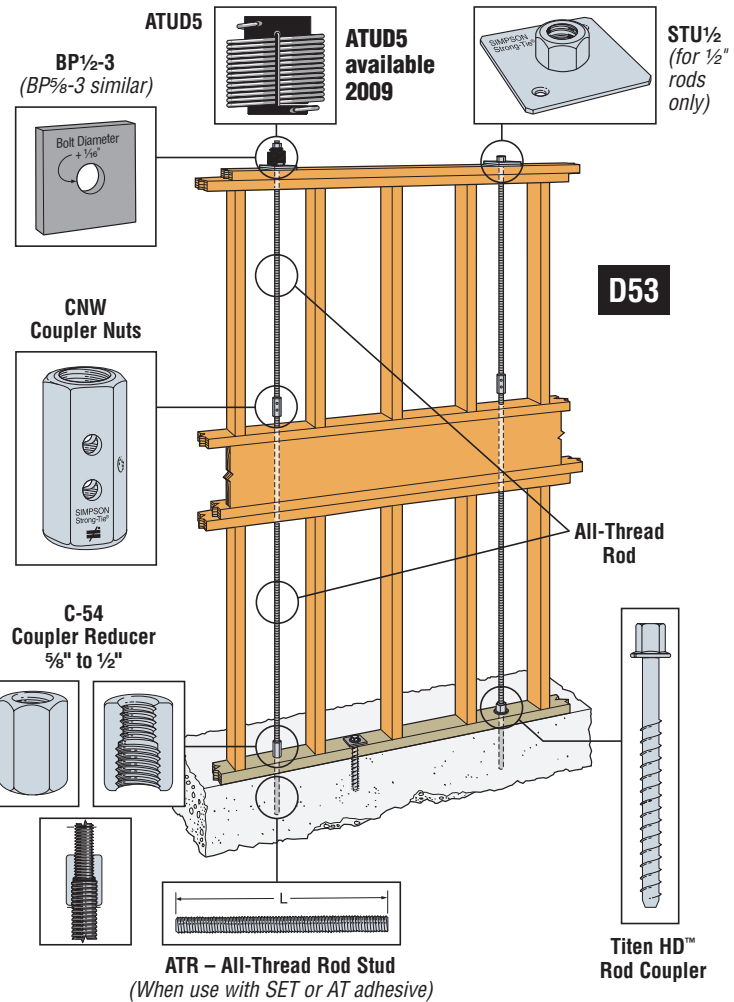
Model No.	Allowable Loads		
	DF	SP	SPF
STU ^{1/2}	3315	3315	3315
BP ^{1/2-3}	5470	4945	3720
BP ^{5/8-3}	5390	4875	3670

- Two 3/8" cut washers required along with BP^{1/2-3} when 3/8" ATR used (3/8" rod should be limited to single-story applications, refer to bullet point 4 above).

All-Thread Rod Allowable Tension Capacity

Model No.	Diameter	Allowable Loads
		Tension (100)
ATR-3/8	3/8"	2105
ATR-1/2	1/2"	3750
ATR-5/8	5/8"	5875

- All-thread rod allowable tension capacities are based on A307 grade C. Simpson Strong-Tie® RFB are equivalent.
- Simpson Strong-Tie® Strong-Rod™ may be used as alternate to all-thread rod (*refer to catalog C-ATS*).
- Allowable loads do not include a steel stress increase.
- ATUD5 allowable compression capacity exceeds the tension capacity of 5/8" rod listed.



Design Values for Anchorage

Component	Anchor Size	Embedment Depth (in)	Uplift (lbs)	F ₁ (lbs)	F ₂ (lbs)
THD37634RC	3/8"	5	2225	390	390
THD501038C	1/2"	8	3885	1240	400
SET ²	3/8"	4.5	1465	485	485
	1/2"	4.25	4275	2125	640
	5/8"	9.375	4220	2215	680
AT ²	3/8"	4.5	1355	430	430
	1/2"	6	2805	625	625
	5/8"	9.375	3770	430	430
Steel Rod ⁶	3/8"	N/A	2105	1085	1085
	1/2"	N/A	3750	1930	1930
	5/8"	N/A	5875	3025	3025
Sill Plate ⁴	3/8"	N/A	N/A	705	570
	1/2"	N/A	N/A	1055	560
	5/8"	N/A	N/A	1485	625

- Allowable simultaneous loads in more than one direction on a single connector must be evaluated as follows:
Design Uplift/Allowable Uplift + Design Lateral Parallel to Plate/Allowable Lateral Parallel to Plate + Design Lateral Perpendicular to Plate/Allowable Lateral Perpendicular to Plate < 1.0, substitute (Design/Allowable)^{5/6} for Titen HD® anchor evaluation. The three terms in the unity equation are due to the three possible directions that exist to generate force on an anchor. The number of terms that must be considered for simultaneous loading is at the sole discretion of the Designer and is dependant on their method of calculating wind forces and the utilization of the anchor within the structural system. See 5th bullet point above.
- Adhesive anchor solutions listed are based on 2000 psi concrete minimum edge distance of 1 3/4", 7" end distance, and uncracked concrete with no supplementary reinforcement.
- Titen HD® anchor solutions listed are based on 2500 psi concrete with a 1 3/4" edge, 8" end distance and uncracked concrete with no supplementary reinforcement.
- Sill Plate design values are based on SP lumber with a load duration factor of 1.6 and the 2005 NDS.
- F₁ loads are parallel to the sill plate and F₂ loads are perpendicular.
- Values do not include a stress increase on the steel.