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# Technical Bulletin

FROM SPEIGHT, MARSHALL & FRANCIS, P.C.

Structural Engineering - Special Inspections
September 2013
Bulletin No. XLIII

# Continuous Threaded Rod Tie-Down Systems (CTRTDS)

## Introduction

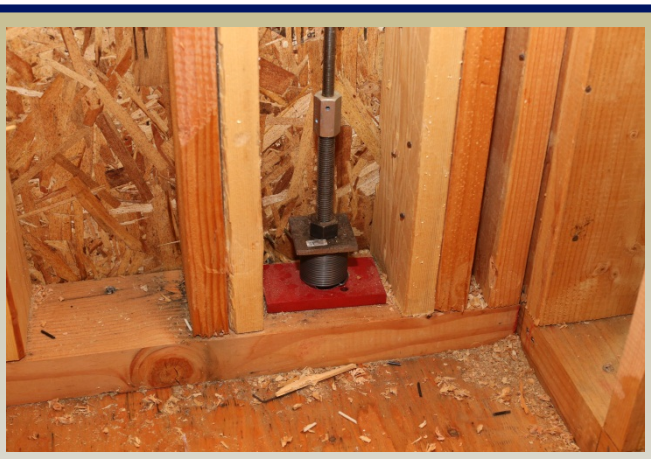
In the U.S. today, residential needs are changing as families move back into multi-family residences, and young people move to the urban areas. To accommodate this need, multi-story wood framed construction provides an economical solution. In addition, using a renewable resource and providing a small building footprint that accommodates a large number of people per square foot helps the environment.

Esthetics also plays a role, as large openings with small amounts of exterior wall space are preferred. This, combined with the multi-story construction, create very large overturning forces on the lateral force resisting system (aka wood-framed shearwalls) from wind and seismic loads. Therefore, Continuous Tiedown Systems (CTS) were developed to help restrain these shearwalls. This technical bulletin will explain the advantages and disadvantages to the CTS's.

ATS (CTRTDS) System by Simpson Strong-Tie

## CTRTDS

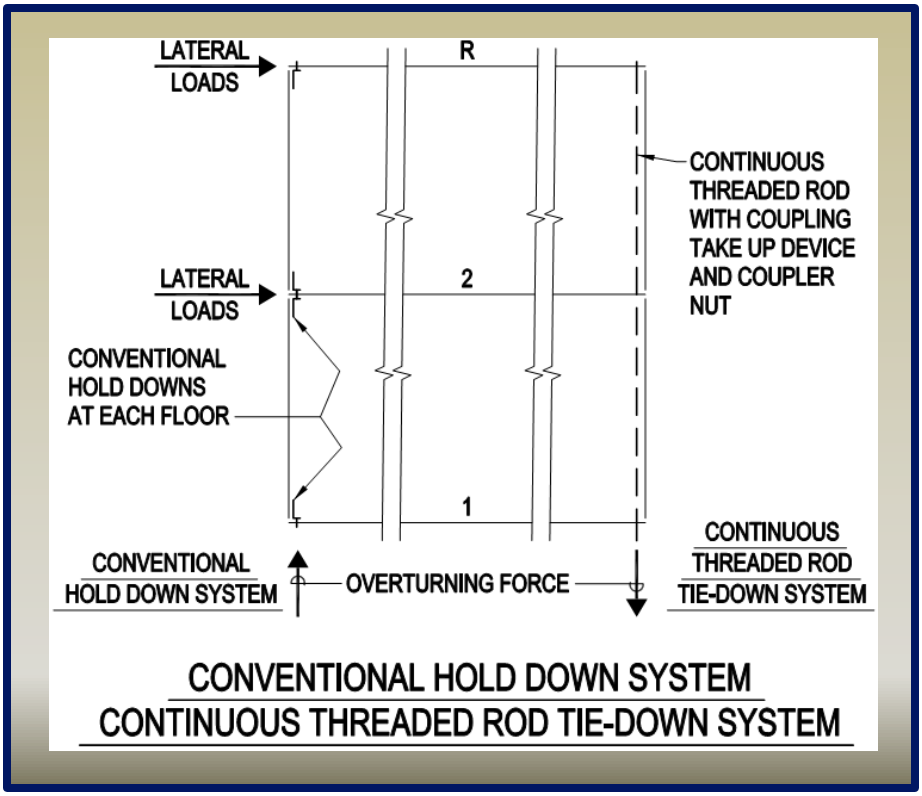
Prior to the development of CTS's, these overturning forces were resisted by attaching straps or holdowns to studs at each floor level, and anchoring the studs to the foundation. The CTS's consist of a series of components (threaded rods, bearing plates, nuts, and take-up devices) which anchor each level and create a continuous load path from the roof to the foundation.



Close up photo of ATS Holddown Coupling device (take-up) by Simpson Strong-Tie. This coupling device takes up the shrinkage that occurs in a wood structure to allow the use of a continuous system from roof to foundation.

There are benefits and disadvantages for each type of system. Some of them are as follows:

- Whereas, a holdown system might be more economical for low story structures, they become less economical than the CTS as the number of stories increases. This is ultimately dependent on the building layout, demand forces, and number or shearwalls.
- There is more rod elongation (stretch) in a continuous tiedown system as opposed to a holdown system, which adds to the building drift.
- Shrinkage is not typically compensated for with holdowns, and that shrinkage amount should be considered in the overall drift calculation. With a continuous tiedown, shrinkage is compensated for with take-up devices and therefore does not have to be considered in the drift calculation.
- The holdowns require a large number of nails, screws, or bolts; The continuous tiedown system consists of less parts to be installed.
- The continuous tiedown systems can resist overturning forces up to 50,000#, while a conventional holdown has a maximum capacity of about 20,000#.




## Conclusion

Continuous Tiedown Systems can simplify design and installation of overturning restraints at the end of wood-framed shearwalls, as well as provide a cost-efficient solution for high overturning forces. Each project should be investigated in order to decide if holdowns or CTS's best meet the needs for the requirements. This action will save the owner and contractor both money and time.

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