STRUCTURAL BUILDING COMPONENTS MAGAZINE (FORMERLY WOODWORDS)
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"Hangers & Support: Meeting the Wood Construction Requirement in the International Codes" by Woods McRoy, P.E.

PURPOSE

The purpose of this article is to address how connectors, used in conjunction with wood construction, can satisfy the requirements of the International Building Code and the International Residential Code, and the efforts of the **National Evaluation Service, Inc. (NES)** to assist with that verification task.

OVERVIEW

Wood construction, as found in typical residential construction and many small commercial buildings, is covered by requirements specified in the International Residential Code (IRC) and the International Building Code (IBC) published by the International Code Council (ICC). These codes contain prescriptive nailing requirements for various connections associated with the wood members of the building's structural system. What many fail to recognize is that the typical and more familiar construction practices covered by these prescriptive

FIGURES 1-7
CLICK ON IMAGES FOR LARGER VIEW

DTC EMBEDDED TRUSS ANCHOR

HD2X TRUSS HOLDOWN STRAP

requirements may not be adequate in high seismic regions, such as California, or high wind regions, such as Florida.

In wood construction, connections are the weak link. Connections using only nails are typically not adequate to handle the loads induced by a high wind or seismic event. As such, the prescriptive provisions found in the IBC and the IRC are not adequate for such areas. In these areas, additional engineering analysis is required to verify the adequacy of the connections. That analysis will often show that additional means, beyond simple nailing, are required for transferring the wind and seismic loads between the wood members that make up the structural system of the building and that are used to resist the loads. The most common way of dealing with these loads is by the use of metal hangers, ties and supports often referred to as joist hangers and truss or rafter ties (connectors). Figures 1 through 7 show some of these connectors.

LFTA6 LIGHT FLOOR TIE ANCHOR

PHDN16 NAIL-ON PREDEFLECTED HOLDOWN

HHCP2 HURRICANE/SEISMIC ANCHOR

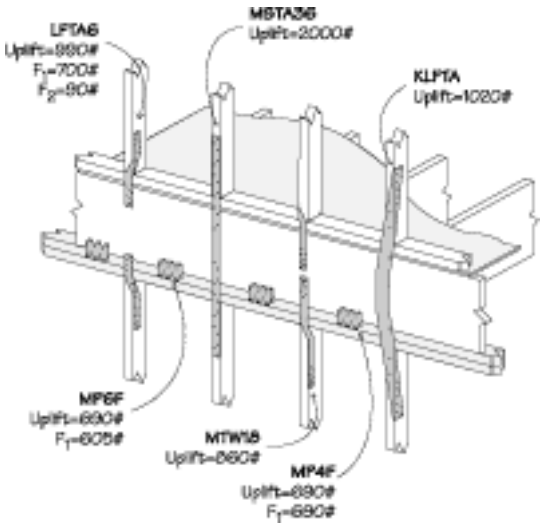
LUGTC2 LIGHT UPLIFT GIRDER TIEDOWN

HOW TO DETERMINE IF HANGERS & SUPPORTS SATISFY THE CODE

HTW16 TWIST STRAP

The problem facing the designer (which includes the builder-designer) and the code official is verifying the allowable load carrying capacity of the connector. Each and every connector is a proprietary product. They will vary in grades of steel, thickness of steel, geometry and the fasteners to be used. As such, they will each have a particular function and a specific capability to carry loads imposed on the building and carried to and through them by the wood members making up the structural system of the building.

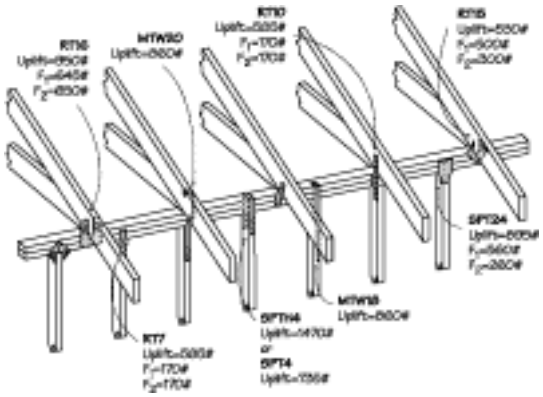
FIGURES 8-9
CLICK ON IMAGES FOR LARGER VIEW



First-Floor-to-Second-Floor-Studs (nailed)

The IBC does not indicate any specific requirements for connectors. However, Section 1715.1 of the IBC does specify how to determine allowable loads for connectors. It outlines a combination of testing requirements and engineering analysis to determine the maximum allowable loads for connectors. Figures 8 and 9 show the load limits of some specific connectors used in roof-to-wall and wall-to-wall construction details.

Most code officials, when reviewing Section 1715.1 of the IBC, will find that their department may not have the necessary manpower or time to review submitted test reports and calculations to determine allowable loads for a specific connector. Most designers will find the process of collecting the information, analyzing it and providing the results to the code official too time consuming and costly to be practical. Also, designers may find manufacturers reluctant to provide the necessary test reports to document the connector performance. Manufacturers and their distributors find the process of going to each and every building department to document the performance of their connectors to be very time consuming and expensive. For these reasons, many of the manufacturers of connectors have chosen to have their products evaluated by the NES. The evaluation by



Rafters-to-Studs-Staggered

NES is conducted the same way code officials would, given the availability of time and resources. The results of that evaluation (e.g. findings) are provided in a report issued and distributed by NES. An easy way to get this information is to download such reports from the NES web site at www.nateval.org.

When a manufacturer of connectors applies for an evaluation by NES, the manufacturer provides descriptive literature, test data and engineering calculations as required by Section 1715.1 of the IBC. This information is then reviewed by the technical staff of the participating members of the NES and a report of the results of the review is written. When the report is complete, it is submitted to a committee of design professionals and code officials for review. After the committee review is complete and the manufacturer has accepted the report, the report is assigned a number (NER-xxx) and published. Code officials and designers may then use the report to verify the allowable load of the connector in question and in so doing, support compliance with the IBC.

WHICH HANGERS & CONNECTORS HAVE BEEN EVALUATED BY NES?

As of the May 2001 listing of NES evaluation reports, the following companies have hangers and connectors that have been evaluated by the NES. As these products and evaluation reports change and evaluation reports on new products are regularly added, consult the NES web site for the most current information on connectors.

Cleveland Steel Specialty Co.
www.clevelandsteel.com
NER-464

Go-Bolt, Inc.
www.go-bolt.com
NER-487

Simpson Strong-Tie, Inc.
www.strongtie.com
NER-209, 393, 413, 421, 422, 432, 443, 469, 499

Solar Group, Inc.
www.thesolargroup.com
NER-408

Tee-Lok Corp.
www.teelok.com
NER-487

United Steel Products Co.
www.uspconnectors.com
NER-478, 505, 510, 530, 532, 564, 568

The current listing and copies of the NES evaluation reports can be found on the NES web site (www.nateval.org). For more information about NES evaluation reports, visit the NES web site or contact the NES at 703/931-2187.

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The National Evaluation Service, Inc. (NES) is an independent, not-for-profit organization that conducts a voluntary and advisory program of evaluation for both traditional and innovative building materials, products and systems to facilitate their acceptance by, among others, the building regulatory community. NES develops technical reports containing descriptions of a building construction material or product, together with a list of conditions necessary for compliance with each of the model building codes, as promulgated by Building Officials and Code Administrators International, Inc. (BOCA), International Conference of Building Officials, Inc. (ICBO), Southern Building Code Congress International, Inc. (SBCCI), and International Code Council, Inc. (ICC).

SBC HOME PAGE

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