TECHNICAL BULLETIN

STRUCTURAL BOARD ASSOCIATION

Representing the OSB Industry

25 Valleywood Drive, Unit 27, Markham, Ontario, Canada L3R 5L9

Tel: 905-475-1100 • Fax: 905-475-1101 • E-mail: info@osbguide.com • website: http://www.osbguide.com

OSB IN HIGH VELOCITY HURRICANE ZONES

Oriented Strand Board or OSB is a popular structural wood building panel manufactured from small diameter logs of southern pine, aspen or other hardwood species in modern, highly automated plants located throughout North America. OSB panels are solid, uniform, strong and without the defects common to other wood structural panels. OSB is fast becoming the structural panel of choice by building professionals for roof, wall and floor sheathing applications in residential and low rise commercial construction.

Like plywood, OSB is a performance rated structural use panel tested and certified by third party agencies such as APA, TECO or other accredited agencies to meet the requirements of US DOC Standard PS 2. As a performance rated panel, OSB provides the same span ratings and Exposure 1 durability as plywood of the similar panel thickness.

OSB has been accepted for the same sheathing uses as plywood by building code authorities and building officials since the early 1980's. This acceptance was initially through individual manufacturers' listings with a National Evaluation Service Report and later as a generic product report under NER 108 or 133.

The South Florida Building Code

In June 1988, the Product Control Supervisor for the Building Department of Miami-Dade County, Florida approved the use of performance rated panels covered by NER 108 under Section 204 of the South Florida Building Code on Alternate Materials and Types of Construction.

Similar to other building codes, the SFBC sets out fastener spacing and size requirements for structural panels installed on supports at 24 inches on center. The requirements were for 6d (2 inch) nails or equivalent spaced at maximum 6 inch on center at panel edges, and 12 inch in the panel interior. For panels over 1/2 inch thickness 8d nails (2 1/2 inch) were required. This pattern was developed through testing and experience as being effective in holding the panels on the trusses, developing diaphragm action between the trusses and providing bracing component to the upper truss chords.

Hurricane Andrew

Hurricane Andrew tested the effectiveness of the SFBC in 1992. Andrew was a class 4 Hurricane that originated in the Cape Verde area of the tropical North Atlantic Ocean. It wrought unprecedented damage along a path through the northwestern Bahamas, the southern Florida peninsula and south-central Louisiana between August 22 and 25. The hurricane struck southern Miami-Dade County, Florida with violent winds and storm surges resulting in the loss of 30 lives and leaving over 250,000 people homeless. Damage estimates were as high as 30 billion dollars to residences, commercial and institutional buildings.

The aftermath of the storm drew the attention of many organizations, which sent expert teams to investigate the damage and determine the principle reasons for the destruction. Hurricane Andrew was not selective in its fury: it severely damaged or destroyed buildings of wood frame, concrete block, reinforced concrete and steel construction. Most severely damaged were mobile homes, industrial buildings and residential subdivisions on the south edge of Miami-Dade County, where new developments were unsheltered from the full force of the storm.

Reacting to the severe damage to roof structures and the loss of roof covering, the Miami-Dade County Board of County Commissioners enacted an emergency ordinance effectively banning certain materials including OSB roof sheathing and building practices such as the use of staples from new construction or repair. The ordinance continues to be in effect to this day.

Performance of OSB

The SBA along with other wood industry associations, inspected a number of severely damaged residential areas in order to assess the performance of OSB and other wood products. John Lowood, professional engineer and then president of the SBA personally toured the damaged areas, which contained homes with either plywood or OSB roof sheathing. He reported that "OSB panels performed equally well as plywood panels in all instances. The main cause of roof failure was inadequate fastening of sheathing panels to truss chords and the lack of bracing at gable ends".

The inspection confirmed that there was no difference in the structural performance of OSB and plywood roof sheathing panels. Sheathing fasteners failed in either pull "through" or pull "out", however, pull out was the primary mode of failure. Similarly the type of roof sheathing used made no difference in the performance of the roof covering material. Roof tile was attached with small dabs of mortar instead of being fully bedded. In other cases barrel tiles were laid on roofs and held by gravity or only one nail. Asphalt shingles were of the lightweight fiberglass type affixed with two or three staples instead of the six required. The thin shingles with minimal tear resistance tore free due to staple crown pull through while tiles were simply lifted off the roof by wind action.

With the assistance of other investigators, SBA measured fastener spacing on panels blown off the roofs and fastener locations on truss top chords. The spacing ranged from 6" to 12" at panel edges and 12" to 27" in the panels interior, well over the code approved limits. It was also observed that the rake overhang on gable ends was butt joined to the gable truss. In cases of failure, the roof sheathing panels were well fastened to the overhang fascia, however there were very few fasteners holding the sheathing to the gable end truss. Under wind action, these perimeter roof panels were pulled off causing the gable end to collapse inward and progressively collapsing the adjacent unbraced trusses.

Other observations made during the inspection were failures at the gable and gable-to-end wall connection due to inadequate lateral support at the ceiling level; failure of building end walls due to hurricane straps attached to sheathing panels and not framing members; rupture of ceiling membranes when gypsum panels were attached to lightweight steel channels; loss of sliding glass doors precipitating the blow-off of poorly attached roof sheathing due to the sudden increase in the internal pressure of the building.

Conclusions

Following the various site inspections, there was general agreement among the investigators from APA - The Engineered Wood Association, the Structural Board Association, the Wind Engineering Research Council and the University of Florida. **They concluded that residential structures constructed of masonry and/or framing performed well in Hurricane Andrew, regardless of the material used, if sufficient attention was given to the prescriptive provisions of the existing South Florida Building Code.**

The Florida Building Code

The 2004 edition of the consolidated Florida Building Code allows the use of OSB as wall "storm" sheathing as follows:

"Exterior stud walls shall be sheathed to resist the racking load of wind as set forth in Section 1620 and the concentrated loads that result from hurricane-generated wind-borne debris as set forth in Section 1626 of this code and shall be a minimum 19/32 inch (15 mm) plywood or Product Approved structural panel, rated Exposure 1 and shall be applied to studs spaced not more than 16 inches (406 mm) on center. Wall sheathing shall be continuous over three or more supports and shall be nailed to such supports with 8d common nails. Nail spacing shall not exceed 6 inches (152 mm) on center at panel edges and all intermediate supports, and shall be 4 inches (102 mm) on center at corner studs, in all cases. When siding such as shingles is nailed only to plywood or Product Approved structural panel sheathing, the panels shall be applied with face grain across studs."

OSB has statewide product approval in Florida via reference to US DOC PS 2, Performance Standard for Wood-Based Structural-Use Panels. However stricter ordinances may be in place in certain jurisdictions. Please consult with the local Building Department before specifying.