

STRUCTURAL BOARD ASSOCIATION MANUAL OF GLOSSARY AND DEFINITIONS

This document contains a glossary and definitions of terms used in the OSB industry, the marketplace and by code regulations. (Part 1). Part 2 provides a more detailed explanation of some of the terms (marked Ref: with the corresponding number at the end of the definition).

1. GLOSSARY & DEFINITIONS

- 1.1. This glossary contains words which occur frequently in “OSB in Wood Frame Construction” and other SBA literature; and/or standards related to OSB in the U.S. and Canada.
- 1.2. The definitions have been simplified where possible to correspond with user recognition.

A.

Abrasion Resistance - the ability to maintain a smooth surface after repeated rubbing or scratching.

Accelerated Aging - a test for panels that attempts to duplicate long term outdoor exposure with short duration of laboratory conditions.

Alberta Research Council - a provincially operated research center with a forest products section.

American Society for Testing Materials (ASTM) - an organization which issues formal test methods for determining product physical properties. (Ref: 2.2.1.1)

Association - a group of companies formed together to improve and promote products and expand their markets.

Aspen - a primary OSB (or waferboard) wood source - a fast growing hardwood tree which primarily grows in Canada and the northern U.S. states.

Aspenite - historically, the proprietary brand name for MacMillan Bloedel’s (now Weyerhaeuser) waferboard and OSB products; also used generically in the market place.

APA- The Engineered Wood Association - an industry association of plywood and structural panel manufacturers, and other engineered wood products such as glulam and I-Joists. (Ref: 2.2.1.2)

American National Standards Institute (ANSI)- an independent standards accreditation body which issues product standards. (Ref: 2.2.1.3)

Association Canadienne de Normalisation (ACNOR) - french translation of Canadian Standards Association (CSA).

B.

Batten Strip - a piece of wood placed over a joint between two panels.

Blender - a machine comprised of a rotating drum in which strands, wafers or chips are coated with resin and wax.

Blocking - a piece of wood placed behind a joint between two panels to make the structure more rigid.

Binder - a material used to join other material (e.g. strands, wafers) together.

BMER Number - Building Material Evaluation Report Number - a sign of a product meeting specified CCMC required technical standards.

Building Officials Council of America (BOCA) - a group of U.S. and municipal county or city building officials who publish the National Building Code.

Bond Durability - the ability of a glue line to hold materials together under adverse conditions.

Buckling - a pulling away of a panel edge from its support structure.

Bracing - a support attached to a portion of a structure so that it will not distort or twist.

Bureau de Normalisation du Québec (BNQ) - a Québec provincial standards writing organization.

C.

Canadian Standards Association - a national standards writing organization. (Ref: 2.2.2.1)

Canadian Construction Materials Center (CCMC) - the building material approvals group under the National Research Council which authorizes the use of new building products in construction controlled by the National Building Code. CCMC replaced CMHC approvals.

Canada Mortgage & Housing Corporation - (CMHC) previously CMHC designed, constructed and financed new home construction in Canada. Today CMHC is primarily responsible to guarantee the National Housing Act (NHA) loan on new housing.

Capacity - the maximum output of an OSB (waferboard) mill assuming 24 hour/ day, 360 days / year operation. Capacity is measured in million square feet, 3/8" thickness basis (MM 3/8). Annual Production usually varies between 320-360 days/year.

Council of American Building Officials - (CABO) the national organization of building officials comprising BOCA, ICBO, SBCCI. CABO publishes the "One and Two Family Dwelling Code".

Certification Agencies - the group or organization that approves the manufacturing of a product to a particular standard. APA and TECO are such certification agencies.

Caulking - an elasticized resilient material used to seal all joints to prevent water or air penetration.

Ceramic Tile - a finished floor or wall covering material made from painted and fire glazed clay.

Core - the center part of an OSB (or other mat formed) panel.

Council of Forest Industries (COFI) - an association of B.C. forest industry companies, including plywood producers. COFI's plywood quality control program department is accredited as a grading agency in Canada, the U.S. and Japan.

Compression Strength - the strength of a piece of lumber or a panel to resist a compressive force applied either parallel or perpendicular to the grain.

Combination Sub-Floor - a panel material which provides structural rigidity and load panel capacity to the structure and also acts as a surface for finished floorings.

Common Nail - a smooth nail with a flat head.

Composite Panel Association (CPA) - an association of North American particleboard and MDF manufacturers which issues the ANSI Standard A208. CPA is very active in formaldehyde release concerns.

Cushion Floor - a vinyl or resilient sheet type floor with a heavy soft back which is soft to walk on and bridges small imperfections in the subfloor.

Clark, Dr. James d'Arcy - the inventor of waferboard in the 1950's at Potlatch in Idaho. (Ref: 2.2.2.2)

D.

Dimension Tolerances - the allowable difference in dimensions, squareness or thickness. For OSB maximum length and width variances is +0, -1/8"; thickness $\pm 1/32$ "; squareness 1/64" per foot; diagonal (corner to corner) difference 1/16".

Density - the average weight of a cubic foot in pounds or a cubic meter in kilograms of the product. For OSB it is usually assumed equal to 40 lbs/ft³ or 640 kg/m³.

Dead load - the self weight of a structure or structural element.

Debarker - a machine that removes the bark from logs prior to Stranding/ waferizing by scraping the logs with a series of knives., or by circular motion in a drum.

Direction of Orientation - the predominant direction of a layer of strands.

Delamination - failure of the bond between strands or layers of strands due to incomplete curing of the resin/glue intended to hold them together. Delamination can occur due to insufficient glue, excess moisture, insufficient heat and not sufficient pressure being applied during the glue curing period.

Douglas Fir/Larch - a group of coniferous trees generally considered to give the highest lumber strength.

Diaphragm & Shear Walls - a wall system constructed in such a manner as to resist lateral forces, e.g: wind or earthquakes. (Ref: 2.2.3.1)

Dryer - a machine which dries the strands from an average moisture content of 100% oven dry basis (ODB) down to 2-5% using hot air. Typically rotary drums or flatline conveyors.

E.

Expansion - the action of increasing the panel dimensions when it is exposed to moisture such as linear expansion and thickness swell. (Ref: 2.2.4.1)

Exterior Bond - a glueing together of strand or wafers with a thermosetting resin to give a bond which cannot be dissolved by water. (Ref: 2.2.4.2)

Exposure I - the ability of a panel to maintain its manufactured, structural properties after prolonged exposure to the elements or long delays in construction.

Exterior Siding - a material, usually either panels or strips which protect the outside of a building.

EA Stiffness - the axial stiffness of the panel determined by multiplying the modulus of elasticity (MOE) by the cross sectional area of the panel. (Ref: 2.2.4.3)

Elasticity - the ability of a panel to return to its original flat state after a load is removed

Edge Support - a structural support located so as to support the panel edge from bending.

Earthquake Loading - the load or stress placed on a wall or floor system due to an earthquake shaking action. (Ref: 2.2.4.4)

Engineering Design - a system which uses the strength or the load resistant properties of building materials to design a structure or structural element, such as sheathing..

F.

Face - the upper surface of a panel.

Forming - a mechanism of making a layer of strands into a mat of a predetermined thickness which after hot pressing will give a panel a desired thickness. (Ref: 2.2.5.1)

Formaldehyde - a very common chemical and one of the components of phenol formaldehyde which is the most common glue/resin used in OSB/waferboard or plywood. When combined with phenol and cured under conditions of high heat and pressure it is insoluble in water and does not release measurable offgassing. Formaldehyde is one of the most common chemicals in today's society and it is contained in everything from cigarette papers and home furnishings to quick drying shirts.

Forintek - a Canadian Research Organization sponsored jointly by Industry and Government. (Ref: 2.2.5.2)

Forest Products Society - an learned society of forest industry employees and researchers, located in Madison, WI. Publishes the Forest Products Journal..

Former - a machine which forms the mat of strands prior to pressing.

Flashing - a metal or plastic material placed at the point of connection between two different materials to prevent water entry into the structure.

Furring Strips - lumber strips usually 1"x 2" placed over wall sheathing to hold exterior siding away from the wall.

Flame Spread Rating - a measurement of the rate which the leading edge of a flame will spread along a panel. It is determined by placing a piece of the panel in a 25' steel tunnel and igniting one end while measuring how long it takes the flame to travel to the other

end. Standards are: for concrete construction it is 0, while red oak construction is 100. The building codes regulate the FSR of interior linings (Ref: 2.2.5.3)

Fire Retardant Paint - the paint system that bubbles and foams when heated thus preventing flame access to the underlying panel or product.

Fire Retardant Treatment - treatment of a panel with fire retardant chemicals or additives.

Fire Stop - a piece of material or wood (or other) installed in an opening to prevent flame or hot gases from entering the opening.

G.

Grades - in the CSA standard O437, waferboard is manufactured in grade R-1, random; and OSB in O-1, oriented face and back; and O-2, oriented face back and core.

Gluing - the act of joining two surfaces together with an adhesive.

H.

Hem Fir - a lumber containing a mixture of hemlock and balsam fir generally manufactured in western north America.

H-Clip - a metal clip in the form of an “H” used to join edges of panels 3/8" thick or greater when used as roof sheathing. H-Clips are a replacement for 2 x 2 blocking when edge support is required.

HUD - the U.S. Department of Housing and Urban Development headquartered in Washington, D.C. HUD sets standards for the manufacture of mobile homes or manufactured homes and may be involved in site built homes under certain situations.

I.

Internal Bond - the tension force applied perpendicular to the panel faces required to pull a panel apart; a measure of the relative resistance of a panel.

International Conference of Building Officials (ICBO) - one of three groups of American Buildings Officials with headquarters in Whittier, California. ICBO publishes the Uniform Building Code.

International Code Council (ICC) - council of building officials consisting of representatives of the three groups of BOCA, ICBO, SBCCI. ICC publishes the International Building Code, a cooperative model building code, which is replacing the National, Standard and Uniform Building Codes in many US jurisdictions. ICC also

publishes other International Codes such as Residential, Fire and Energy Conservation.

Impact Load - the load carried by a panel when a weight is dropped on the panel from an elevated distance.

J.

Joist - a horizontal lumber (or engineered wood) component of a floor, ceiling or roof system.

Joist Spacing - the distance between two joists measured from each joist's center line. Typical joist spacing 16", 20", 24" apart.

K.

Kerf - the material removed from a panel by a saw when it is trimmed or sawn into pieces. The kerf is the width of the saw teeth, usually 1/8".

L.

Long Direction - the direction of a panel in the 8' length.

Live Load - the gravity load on the structure from an external force other than wind or earthquake. In a house, live load is the weight of the people in the room or the furniture etc.

Loose-Lay Flooring - a special type of flooring developed for use over wood subfloors. Rather than being fully glued or nailed down, it is stapled or glued around the perimeter of the room only, or simply floating without fasteners. (also laminate flooring)

Linear Expansion - the increase in dimension of a panel when it is exposed to changing moisture conditions. OSB manufacturers cut panels slightly undersize to allow for linear expansion due to moisture pick up between manufacture and application. The coefficient of linear expansion varies from 0.3% to 0.5% depending on the criteria. (Ref: 2.2.4.1)

Lateral Nail Resistance - is the amount of force required to rack a frame made of 4' x 8' panels nailed to 2 x 4 studs so that nails pull through the panel edges.

M.

Mat Formed - formation of a panel of strands or wafers or flakes in a mat or mattress like form prior to pressing. Also as opposed to veneer lay-up.

Material Release - Acceptance number for product issued by HUD for use in mobile or

manufactured homes.

Marks - panel identification. (Ref: 2.2.6.1)

Material Safety Data Sheet (MSDS) - an information sheet listing the components of the product, the hazard level of the product when used and how to extinguish fires should the material catch fire, and other safety issues. (Ref: 2.2.6.2)

Modulus of Rupture (MOR) - the force applied in bending or flexure required to break a panel into two or more pieces. (Ref: 2.2.6.3)

Modulus of Elasticity (MOE) - the measure of the stiffness of a panel which resists bending and allows it to return to the flat condition when the load is released. (Ref: 2.2.6.4)

Moisture Content - the weight of the water absorbed by a panel. Moisture content is determined by drying the panel and weighing it completely dry. The difference in weight between the wet stage and the dry stage divided by the dry stage equals the moisture content, oven dry basis (ODB).

N.

National Evaluation Report (NER) - this is a report issued by the Council of American Building Officials (CABO) providing design information, installation procedures and product specifications. (Ref: 2.2.7.1)

National Research Council (NRC) - the Canadian federal research organization carrying out research on building materials (Institute for Research in Construction) and responsible for the National Building Code of Canada. (National Codes Center).

National Building Code of Canada (NBCC)- the model code of Canadian building practice. This code specifies minimum levels of construction and materials. It is primarily a health and safety document. Buildings constructed in accordance with the NBCC will be safe to occupy, will be healthy to live in, will not collapse and allow time to escape in case of fire. (Ref: 2.2.7.2)

Nail Holding - the holding power of a nail determined by the load the nail can carry when hammered into the material. (Ref: 2.2.7.3)

Nail Head Pull-through - the load that will pull the panel off the wall over the top of the nail head. (Ref: 2.2.7.3)

National Building Code (U.S.) - a model Code of building practice published by the Building Officials and Code Administrators (BOCA), Country Club Hills, Illinois.

O.

On Center (o/c) - the distance between the center lines of two parallel pieces of wood e.g. joists o/c is the distance between center lines of two parallel joists in a floor.

Orientation - the direction of the strands in the panel.

Oriented Strand Board (OSB) - a type of mat-formed panel with oriented face and back strands and possibly cross oriented core strands, and made of strands whose length is at least twice their width. (Ref: 2.2.8.1)

Occupational Safety & Health Agency (OSHA) - a U.S. Federal Government Agency which sets standards for harmful substances in the workplace. OSHA is involved with formaldehyde release and wood dust problems.

ODB (Oven Dry Basis) - measurement of moisture content related to the oven dry or bone dry weight of the material.

P.

Permeability - the rate at which moisture vapor or free water will pass through a piece of material such as OSB. Permeability depends on the structure of the panel. A fibreglass sheathing panel has high permeability vs. a rigid foam sheathing panel which has very low permeability. OSB's permeability is slightly higher than plywood. (Ref: 2.2.9.1)

Primer Sealer - the first coat of paint placed on raw unpainted wood.

Preservative Treatment - the treatment of wood which prevents decay from moisture or bacteria. (Ref: 2.2.9.2)

Pressing - the act of squeezing a panel together.

Phenolic Resin - an adhesive used to bind the strands/ wafers together in OSB/waferboard Phenolic resin has the characteristic of becoming very solid and waterproof when cured. A common product made from phenolic resin is a saucepan handle. Phenolic resin may also be called phenol formaldehyde resin.

Performance Standard - a standard which lays out the performance strength characteristics of a panel. CAN/CSA 0325.0 is a performance standard, so is the U.S. DOC PS 2.

Product Standard - a standard which states how a product must be manufactured. CSA 0437.0 and ANSI A.208.0 are product standards.

Q.

Quality Control - the act of ensuring that a product is manufactured in accordance with minimum manufacturers or CSA or U.S. standards. (Ref: 2.2.10.1)

R.

Rated Sheathing - a structural panel product which has been tested to perform in a certain manner, e.g.: a 24/16 rated sheathing panel must be used on maximum 24" centers for roofs and 16" centers for floors. Rated OSB is rated sheathing.

Ring Nail - a nail with a serrated or roughened shaft.

Resilient Floor - a vinyl sheet material usually patterned and glued to the subfloor or underlayment.

Roof Pitch - the slope of a roof.

Racking Test - a test which determines the strength of a panel when mounted in a stud frame like a wall.

Racking Resistance - a maximum design force determined by the racking test

Roof Sheathing - panel of board products which are applied directly to trusses or rafters prior to installation of finishing roofing surface. (Ref: 2.2.11.1)

S.

Scratch Coat - a mixture of concrete placed directly on a subfloor prior to installation of ceramic tile. Generally ceramic tile is set in a mortar base on top of the scratch coat.

Specific Gravity - a ratio of the mass of a panel to the mass of equivalent volume of water. OSB has an average gravity of 0.64.

Spruce-Pine-Fir (SPF) - a common species group of lumber produced in most areas of Canada

Shear - a force placed diagonally in a panel at the supports

Seismic Loading - the earthquake force transmitted on a panel frame or wall

Span Rating - the load carrying capacity of a panel (See Rated Sheathing) (Ref: 2.2.12.1)

Starter Strip - the first layer of roofing material placed around the edge of the roof.

Slasher - a saw which cuts the whole trees into shorter lengths.

Sandwich Panel - a panel with a foam core and OSB or waferboard on either surface. Also called structural insulated panel (SIP).

Stressed Skin Panel - an engineered building panel composed of 2 sheets of plywood or OSB mounted on either side of a lumber frame. Stressed skin panels may be left empty or filled with foam.

Southern Building Code Conference International Inc. (SBCCI) - a group of building officials responsible for codes and standards in the South Central US. SBCCI issues the Standard Building Code

Soffit - the area of a roof under the eaves, typically horizontal and with ventilation ports.

Spiral Nail - a nail with a twisted shank.

Stud - the vertical lumber component of a wood-frame wall. Stud spacing is the distance between the center lines of two adjacent studs.

Subfloor - the initial floor cover. The subfloor may be covered with an underlay or resilient floor, hardwood or ceramic tile. A subfloor is the material placed directly on the joists.

Sanding/Sizing - the operation of reducing the thickness of a panel.

Squareness - the amount of angle between two 90° edges on a panel.

Strands - wafers whose length is minimum twice its width.

Screen - a device to sort wafers into their various sizes.

Shop Panel - a panel which does not meet all the requirements of the grade, because of certain deficiencies such as broken corners or edges.

Standards - CAN/CSA 0437.0 - OSB and Waferboard establishes property requirements for three grades of waferboard and strand board namely R-1, O-1 and O-2.

CAN/CSA 0437.1 - Test Methods for OSB and Waferboard directed specifically to test methods for construction use panel. This standard is generally harmonized with referenced test methods in ASTM D1037.

CAN/CSA 0325.0 - Construction Sheathing is a performance based

standard which establishes the minimum physical, bond durability and structural performance criteria appropriate for the intended use as floor, wall or roof sheathing in light frame construction. It may be applied equally to wood based panels. It is harmonized with PS 2.

CAN/CSA 0325.1 - Test Methods for Construction Sheathing the main purpose is to provide test methods for the assessment of wood based performance products.

PS 2 - Performance Standard for Wood-Based Structural-Use Panels - a voluntary product standard developed under procedures published by the U.S. Department of Commerce, and coordinated by the National Institute of Standards and Technology. It is harmonized with CSA O325.

Surface Treatment - some panels have surface treatment to make them less slippery when used as roof sheathing, primarily by providing a rough texture with metal screens.

Storage - as a wood product OSB should be kept flat and in covered storage until use. Manufacturers use shrouds or cardboard protection on units of T&G products. Other units may have shroud or cardboard protection at manufacturer's option. (Ref: 2.2.12.2)

Structural Board Association - SBA is a group of forest product companies manufacturing the popular structural panel products OSB or waferboard. The Association's purpose is to improve the products, expand the market through education and promotion and ensure the recognition of the product by code approval authorities (Ref: 2.2.12.3).

T.

Thickness Variation - the difference in thickness within a panel.

Thickness Swell - the increase in thickness when a panel is exposed to moisture. (Ref: 2.2.4.1)

Thermal Resistance - the insulating property of a building material or panel.

TECO Corporation (TECO) - a private testing organization which is accredited to make tests on products in accordance with the minimum standards of mill certification and/or CSA-O325 or PS 2 requirements. TECO carries out regular quality control checks of some SBA mills.

Truss - a system of lumber components held together with light gauge metal plates, manufactured and installed to hold up a roof or a floor.

Touch Sanding - a light sanding which removes the high points in a panel.

Thermal Plastic - a material which becomes soft under heat.

T&G Edge - tongue and groove, a machined panel edge which has the ability to hold firm with the edge of the adjacent panel.

Tension Strength - a strength of a panel when pulled in the long direction.

Thickness of OSB - the most common thicknesses are 1/4", 5/16", 3/8", 7/16", 1/2", 5/8" and 3/4". Or nominal variations such as 15/32", 19/32", 23/32". Manufacturers may supply other thicknesses for specific end uses and particular markets. Also the span rating system allows slightly thinner panels to be used in certain cases at a cost saving to the builder.

U.

Underlayment - a panel product which is placed on top of the subfloor and underneath the finished floor covering.

Underwriters Laboratory (UL) - the fire testing agency in the U.S. which issues a products fire rating based on a formal UL testing procedure.

U.L. of Canada (ULC) - the Canadian Fire Testing Agency which issues a ULC fire rating of a product based on a formal UL or ULC testing procedure.

Uniform Load - a load placed on a floor or roof so that each square foot carries the same weight.

Uniform Building Code - a Code of building practice published by the International Conference of Building Officials (ICBO) Whittier, California.

W.

Waferizer - a machine that converts whole trees into wafers. It cuts the tree in the long direction versus a chipper which cuts a tree in the cross direction.

Wafer - a wood flake produced by a waferizer with a minimum length of 1-1/4", a controlled width and controlled thin thickness. A wafer is essentially flat with the grain running in the direction of the length.

Wax - an ingredient of OSB/waferboard panels which is mixed with the strands/ wafers prior to forming for the purpose of reducing the rate of water absorption of the panel.

Waferboard - an exterior bonded structural panel product made from wafers. (Ref: 2.2.13.1)

Wood Frame Construction - a method of constructing a building using lumber and wood panel products. Also known as light frame construction.

Water Absorption - the act of a panel picking up water when wet or exposed to rain.

Wall Sheathing - panels or boards applied directly to the exterior stud walls before applying the finished exterior siding or brick veneer. (Ref: 2.2.13.2)

2. EXPLANATION OF TERMS

2.1 This section provides more information on selected glossary items.

2.2 The explanation is purposely non technical for ease of understanding.

2.2.1.1 American Society of Testing Materials (ASTM) - This organization operates through a committee structure and wide ranging consensus. SBA is represented on ASTM committee D7 pertaining to Wood. Developing a test procedure standard requires submission of the draft procedure to a subcommittee which reviews the draft, makes any changes and then submits it to the full committee for vote. Any negative vote must be explained and resolved prior to the procedure being published. Test Standards are reviewed every five years (or sooner).

2.2.1.2 APA - The Engineered Wood Association. This Association originally represented plywood manufacturers in the northwest U.S. In the early 1970's membership was expanded to include the southern yellow pine region and in the late 1970's to include composite panel manufacturers. It now also represent manufacturers of glued laminated timber beams, and wood I-Joists. APA has a substantial field organization, an excellent testing and development laboratory and promotes panels in the U.S., Canada and Japan.

2.2.1.3 American National Standards Institute (ANSI) - This organization operates through a consensus system. Each standards generating group such as the Composite Panel Association submits a draft standard to ANSI along with a list of commentators who can vote or make a comment on the standard. ANSI approves the format of the standard and the list of commentators. The draft standard is then distributed to the commentators for comments and continues until all negative comments have been resolved. Once this happens, the standard is then published by ANSI. ANSI requires that the standard be reviewed every five years.

2.2.2.1 Canadian Standards Association (CSA) - This is a national organization which produces standards. Standards are prepared or modified by a committee structure comprising representatives from manufacturer, user, specifier, code authority and general interest groups. After the draft standard is approved by a majority vote of the committee it is sent out for public comment to a group of commentators. Once approved and negative votes resolved it is published as a CSA Standard. The drafting committee must be satisfied that changes or procedures are backed by recognized experts or published testing methods.

2.2.2.2 Clark, Dr. James d'Arcy - Invented the waferizing process whereby smaller low-grade forest stands could be converted into use as structural panels. He developed a small scale prototype plant in the early 1950's in Idaho, USA. In 1961, a plant was established at Hudson Bay, Saskatchewan, which successfully extended Dr.

d'Arcy Clark's process into commercial production. This plant was closed in 2002 by the Weyerhaeuser Company, after a newer, larger mill had been put in operation at the same site. Since the early seventies, first waferboard and then later OSB plants have been constructed all over Canada and the U.S. By 2000, there were 39 plants in the U.S. and 22 in Canada. As of end 2003, there were 76 plants in operation worldwide.

2.2.3.1 Diaphragms or Shear Walls - There are several forces acting on a building: dead load - the weight of the structure; live load - from its occupancy; snow load, and lateral loads such as wind load and earthquake load. While the first three act vertically, wind and earthquake loads act horizontally and attempt to knock the building over or twist it out of shape. Horizontal and Vertical Diaphragms or Shear Walls are constructed to withstand these forces and hold the frame rigid. They are usually constructed with panels placed either vertical or horizontal, or boards at 45° angle attached to the studs and are designed to resist a racking or twisting force.

2.2.4.1 Expansion - All wood products expand when wet unless they are specifically treated so as not to absorb water. The rate of expansion is determined by the moisture content before wetting with the most rapid expansion occurring in the moisture content range of 0-7%. Special treatment are of two types: one, to prevent water entering the individual wood cells through the cell walls; or two, replacing the water in the cell with another substance. The addition of wax to the wafers prior to pressing slows the rate of water entry into the cells. Chemical treatment fills the cells with another substance. The maximum allowable linear expansion for OSB or waferboard is 0.35% which means an increase in length of a panel by 3/16" or 4.5 mm. For products meeting CSA-O437 OSB is allowed to swell 10% after 24 hours soaking if ½" or greater thickness and 15% if less than ½ " thickness. Other standards have other requirements.

2.2.4.2 Exterior Bond - A common misconception is that, if a product has an exterior bond, it is waterproof. It really means that the glue or resin holding the product together is not soluble in hot or cold water. This is accomplished by using a resin system which is cured by the application of both heat and pressure. Phenolic formaldehyde resin used in OSB/waferboard is a waterproof resin while urea formaldehyde used primarily in particleboard and MDF is not.

2.2.4.3 EA Stiffness - Axial panel stiffness is a product of its modulus of elasticity and its cross sectional area. Elasticity is measured in pounds/in² (psi) or kilo-pascal (kPa). The cross section of area is determined by the product of width and thickness measured in square inches (in²) or square millimeters mm². Multiplying the stiffness by the area gives the EA stiffness.

2.2.4.4 Earthquake Loading - North America is divided up into a number of earthquake zones based on the historical frequency and strength of earthquakes in each zone. The highest incidence of earthquakes have occurred along the west coast and the second highest along a strip inland from the east coast through the Appalachian and Laurentian mountains. Earthquake forces are measured in terms of gravity applied to the mass of the structure and is considered to act in a lateral or sideways manner against the structure. Earthquake forces are resisted by diaphragms, shear walls and bracing.

2.2.5.1 Forming - This is a critical stage in the manufacturing of OSB and waferboard. This stage sets the uniformity of physical properties throughout the panel. It also determines whether the panel is to be random or oriented. The forming machine is composed of a number of bins with live bottoms composed of rotating disc type screws. The strands or wafers are discharged from the bins over these screws on to a traveling conveyor belt or forming box (older machines). The rate of discharge is closely coordinated with the rate of movement of the box or belt to give the correct thickness to the resulting mat. Depending on the design and position of the discharge screws, the strands or wafers fall on the belt in a random or oriented manner. Orientation occurs when the spaces between the screws discs are almost vertical so that the strands must fall from the box in the direction of the screw rotation. The O-1 OSB former has screws in the same direction than the belt travels for the face and back. O-2 OSB has the same plus screws traveling at right angles to the belt for the core.

2.2.5.2 Forintek - Formerly the Canadian Federal Government Forest Products Laboratory. In 1978 the two labs, one in Ottawa and one in Vancouver were partially privatized and are now substantially funded by the forest products industry. The Ottawa lab was moved to Québec City in hte early nineties, except the Fire Lab. Management of Forintek reports to a Board of Directors with industry and government members. Government funding comes from the Canadian Forestry Service. Research is guided by National Research Program Committee which meet twice a year and a mix of member representatives, staff, and interested government personnel. Forintek carries out contract research for the forest industry and others as well as basic core research.

2.2.5.3 Flame Spread Rating - This is an important rating for panel products as it establishes the rate at which a live flame spreads along the face of a burning panel. As most fires spread due to a combination area the tunnel 25 foot test method takes both events into consideration. At the same time the rate of heat and smoke generated can be determined. OSB has been tested and has a rating which satisfies certain criteria set out in the model building codes.

2.2.6.1 Marks - All panels in Canada must be marked with the standard designation as well as the following additional information.

- (I) The manufacturer's name.
- (ii) The words EXTERIOR BOND.
- (iii) The appropriate grade (e.g.: O-2) or span rating (e.g. 24/16).
- (iv) The nominal thickness.
- (v) The words "THIS SIDE DOWN" on tongue and groove products.

In the USA the Certification Agency (e.g.: TECO or APA) must indicate the PS 2 standard on its product stamp. Building inspectors in Canada and the U.S. can verify the properties of the structural boards in use by these stamps.

The panel stamp shows the end use for which the product is designated (sheathing or flooring) the panel thickness, the National Evaluation Report number and exposure durability classification. Most panels are classified as EXPOSURE - 1. This means the panels are intended for construction applications where the ability to resist moisture during construction delays is required.

2.2.6.2 Material Safety Data Sheet (MSDS) - lists the hazardous ingredients, and other panel characteristics of OSB or waferboard panels. It also provides first aid procedures and special safety precautions. A generic MSDS is available from the SBA upon request.

2.2.6.3 Modulus of Rupture MOR - This is measured by placing a strip of the panel 3" wide and length 24 x the nominal thickness plus 2" on two supports and applying a load from a testing machine at mid span. MOR in psi or kPa is the point at which the test panel breaks in half. This test is governed by the requirement of ASTM D1037 Standard Test Method for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials.

2.2.6.4 Modules of Elasticity MOE - Using the same sample size and equipment as for MOR, the deflection of the test strip at its non destructive proportional limit is noted and the MOE is calculated from a set equation in accordance with ASTM Test D1037.

2.2.7.1 National Evaluation Report (NER) - Random waferboard was originally covered by NER 315 and oriented strand board under NER 322. In 1988, these two reports were combined as NER 322. The SBA report is no longer maintained, as OSB is regulated in the U.S. by PS 2. Proprietary OSB products or systems are still covered by NER's.

2.2.7.2 National Building Code - The National Building Code of Canada is revised every five years. Prior to re-issue all stakeholders have the opportunity to request changes to the code and the final draft is sent out for public comment prior to publication. The two parts of the Code applicable to OSB and Waferboard are Part 9 (Housing & Small Buildings) and Part 4 (Structural Design).

2.2.7.3 Nail Holding - These tests are undertaken to determine the resistance to lateral movement of the nail in the panel; to measure the resistance to withdrawal of a nail driven completely through the panel and to measure the resistance of a panel to having the head of the nail pulled through the board. These tests are undertaken in accordance with ASTM 1037.

2.2.8.1 Oriented Strand board (OSB) - OSB is the abbreviation for Oriented Strand board or Oriented Structural Board. A strand is the descriptive term for a narrow wafer; by definition the length of a strand should be twice as long as its width. In OSB panels, the wafers or strands are deliberately aligned or oriented. This improves the qualities in the direction of alignment while reducing them slightly in the perpendicular direction. Wafers are sliced from the side of clean debarked wood logs so that the plane of the wafer is parallel to the grain of the wood. These freshly cut wafers are then dried to a moisture content of approximately 3%. They are screened. "Fines" (small flakes) are removed and together with the bark, are used for energy production. Next, the wafers are blended with special phenolic resin and some wax to guarantee good bonding and to reduce water absorption. The wafers, now coated with the phenolic resin, pass through the formers which lay down a continuous mat (or sheet) of wafers in a random pattern on to a conveyor system.

2.2.9.1 Permeability - Permeability is becoming an important factor in comparing OSB/waferboard to other panel products. The ability of OSB/waferboard to allow passage of water vapor when used as wall sheathing to dry out the wall cavity is becoming as important as its ability to shed water when used as packaging. Permeability is also called water vapor transmission and is usually measured in perms. It may be determined by the dry cup (desiccant) or wet cup (water method) in accordance with ASTM Test Method C355.

2.2.9.2 Preservative Treatment - As most treatment methods use water soluble chemicals, the only suitable preservative treatment for OSB/waferboard has been the addition of chemicals during the blending operation.

2.2.10.1 Quality Control - Each SBA mill is responsible for its own quality control program.

The effectiveness of the program is measured by regular test sampling by APA or TECO. Member mills are required to maintain levels of properties obtained at time of initial qualification by the appropriate certification agency.

2.2.11.1 Roof Sheathing - OSB/waferboard makes a strong, rigid, long-lasting roof panel, as an economical replacement of plywood.

Members of the Structural Board Association have proprietary panels which are

specially engineered for roof sheathing applications - and are not just general purpose roof and wall sheathing panels. These panels provide extra safety for roof framers - even on steep roof pitches - because of the improved traction of the surfaces. These surfaces may be roughened, dimpled and screened to give improved footing and safety. Roof sheathing made by Members of the Association, are recognized by all the major North American Building Codes.

- 2.2.12.1 Span Rating - Span index numbers (or Span Rating) are a key element of the Performance rating system. A span rating is the number that appears in the trademarks of the APA or TECO. On sheathing panels, it is common to show two numbers separated by a slash (e.g. 24/0, 24/16, 32/16).

The left hand number is the maximum recommended center-to-center spacing of supports in inches when the panel is used for roof sheathing with the long direction across the supports.

The right hand number is the maximum center-to-center spacing of supports in inches when the panel is used for subflooring with the long direction across the supports.

For wall sheathing, the left hand number applies to stud spacing.

For Rated Single Layer Floors or Sturd-I-Floor (the APA equivalent) a single span rating number appears on the trademark on the panel. This number indicates the maximum recommended center-to-center spacing between floors joists with panels laid with the long dimension across three or more supports.

A 24/16 Span Rating means that the panel is rated 24" o.c. on roofs and 16" o.c. on subflooring.

A 24/0 Span Rating means the panel is rated 24" o.c. for roof sheathing and is not rated for subflooring.

An example of one manufacturer's span rating is showing in Exhibit I.

By definition, any panels that meet the same span rating perform to the same minimum criteria.

Certification of performance ratings are carried out by independent agencies. The two best known agencies are APA and TECO. Both have been established for over 50 years as certification agencies and they are both internationally recognized.

- 2.2.12.2 Storage - If storing OSB/waferboard for long periods, store bundles indoors or under cover to prevent excessive pick up of moisture which can cause warping and other dimension changes.

Do not store in contact with the ground. Panels should rest on enough level stringers so that the load remains flat. Cover the panels adequately. If storing outdoors, cover with plastic sheets or tarps, allowing space at the bottom and sides for good air circulation. Whenever excessive moisture pick up is expected, cut the steel bonding on the stack to prevent edge damage.

On the job site, schedule delivery in a dry storage area, and close in the structure as quickly as possible. Installed panels can be sanded to restore smoothness.

- 2.2.12.3 Structural Board Association (SBA). The Association, first known as The Waferboard Association, was established in 1976 with four members, MacMillan Bloedel, Weldwood, Waferboard Corp. and Great Lakes Forest Products.

At inception, its primary purpose was to expand the market through promotion and acceptance by code authorities. This purpose continues today and includes research to improve the performance and quality of the products waferboard and oriented Strand board. The Association's office is in the Toronto, Ontario, Canada area. The Association provides product booklets on Canadian and US installation practices. It also has a video on the manufacture and use of OSB and waferboard. Staff will answer technical questions or provide guidance on installation or usage problems as well as undertaking claim investigation as requested.

In addition to direct producing members, the Association includes associate, affiliate or academic members who are selected for particular relationship or assistance to the industry.

The Associations's address and phone numbers are: 25 Valleywood Drive, Unit 27, Markham, Ontario, Canada, tel. 1-905-475-1100, fax 1-905-475-1101, web site: www.osbguide.com, e-mail address: info@osbguide.com

- 2.2.13.1 Waferboard is a first generation engineered product made from wafers cut exclusively from round-wood.

The wafers are bonded with a waterproof phenolic resin which combines with the wafers to provide strength, rigidity and moisture resistance to the finished panel. It is the wafers, with their uniform thickness and controlled length (at least 30 mm or 1-1/4"), which gives waferboard its strength and stiffness. A minor amount of wax is incorporated to aid dimensional stability and inhibit moisture pick up.

Wafers are sliced from the side of clean debarked hardwood logs so that the plane of the wafer parallels the grain of the wood. These freshly cut wafers are then dried to a moisture content of approximately 3%. They are then screened. “Fines” (small flakes) are removed and together with the bark, are generally used for energy production. Next, the wafers are blended with special phenolic resin and some wax to guarantee good bonding.

The wafers, now coated with the phenolic resin, pass through the formers which lay down a continuous mat (or sheet) of wafers in a random pattern on to a conveyor system.

Waferboard Versus OSB - A Comparison - Waferboard and OSB both have engineering characteristics which give each panel advantages over the other, (and other types of panels) for specific applications. Waferboard by definition is made from wafers. OSB is made from strands. OSB by definition is oriented (aligned). Waferboard can be oriented (OWB or Oriented Wafer Board) but is generally engineered with wafers laid in a random pattern.

Random waferboards have approximately equal strength in both directions, both along and across the panel. This has advantages in applications such as wall sheathing or packaging where strength is required in both directions. OSB is stronger in the long direction. OSB has advantages for stiffness and rigidity across supports in such applications as roof sheathing or sub-flooring. Very little waferboard production remains to date. OSB is now the predominant structural panel.

- 2.2.13.2 Wall Sheathing uses the strength and “racking resistance” of the material (that is, the resistance to keep a frame square or plumb), making OSB and waferboard the ideal materials to work with.

By using OSB or waferboard, builders do not need extra corner bracing. OSB will not puncture or tear and installation is quick and easy. Remember that OSB or waferboard can be used for both inside and outside walls. It is rated EXPOSURE 1 - the designation of panels intended for protected construction applications where the ability to resist moisture during long construction delays or where exposure to conditions of similar severity is required.

EXHIBIT I

AN EXAMPLE OF SPAN RATINGS

<u>Thickness</u>	<u>Span Rating</u>	
5/16"	Wall 24	Wall sheathing with supports at 16" or 24" O.C. most applications.
3/8"	24/0	Roof sheathing 24" O.C. With clips
7/16"	24/16	Roof Sheathing 24" O.C. No Clips
15/32"	STRUC I	Structural I Rated Sheathing 32/16
15/32" (or 1/2")	32/16	Roof Sheathing 28" O.C. NO CLIPS. 32" O.C. WITH CLIPS. Sub Flooring 20" O.C.
19/32" (or 5/8")	40/20	Rated Sheathing. Roofs 32" O.C. - 40" O.C. - Sub Flooring 20" O.C.
19/32"	20 O.C.	RATED STURD - I - FLOOR, single layer floor; under carpet and pad. Roof 32" O.C.
5/8"	STRUC I	Rated Sheathing 40/20
23/32" (or 3/4")	48/24	Rated Sheathing. Roofs 36" O.C. NO CLIPS - 48" O.C. WITH CLIPS. - Sub Flooring 24" O.C.
23/32" (or 3/4")	24" O.C.	RATED STURD - I - FLOOR, single layer floor; under carpet and pad.

(Metric conversion: 1" = 25.4 mm)