



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>

BINDERS AND WAXES IN OSB

Oriented Strand Board (OSB) is a structural wood-based composite panel, consisting of mostly wood strands pressed together with small amounts of the following binding additives.

1. BINDER SYSTEMS

A. Phenolic resins:

Phenolic resins are the most common binder used to manufacture Oriented Strand Board (OSB), as well as plywood, glass fibre insulation and other products. They are available in liquid form (aqueous solution) and in powder form. These resins are thermosetting: once cured they cannot be softened by heating. They are extremely resistant to water and will not break down in the presence of moisture. Phenolics are the oldest form of plastics. They have been used for a variety of applications for over 100 years and as wood based panel binders for over 60 years.

Phenolic resins are made by reacting phenol with formaldehyde in alkaline conditions. Phenol is produced from crude oil and formaldehyde from natural gas. Once pressed, OSB panels are virtually free of any residual phenol and formaldehyde and are considered to be completely safe to use, burn and landfill. Similarly, OSB sawdust and sander dust should be considered as wood dust with respect to health and safety issues.

SBA publishes a series of technical bulletins on test methods for phenol-formaldehyde resins.

B. Isocyanate binders (MDI)

Liquid polymeric diphenyl methane di-isocyanate (MDI) binders are an alternate binder system used by approximately 35% of the OSB mills (alone or in combination with phenolics), and bring to wood composites the same advanced polymer technology used in engineering thermoplastics and polyurethanes. Investigations characterizing MDI bonded wood composites have shown the adhesion mechanism to be chemical and physical in nature. MDI binders react with molecules containing "active" hydrogens to produce polyurethane and polyurea based molecules. The source of these active hydrogens can be hydroxyl groups present in the wood, wood extractives, and/or wood resins, as well as moisture in the wood. Many of the same physical properties the polyurethanes exhibit, such as toughness and durability, are also present in wood composites processed with MDI binders. Finished products, as used, are virtually free of unreacted MDI. Sawdust and sander dust from the finished product should be considered as wood dust with respect to health and safety issues.

A question and answer position paper by a major chemical manufacturer and Associate Member of SBA is available for further information.

2. WAXES

A small amount of wax (usually less than 1.5% by weight) is added in the OSB manufacturing process to improve the board's resistance to the effects of normal construction delays. OSB manufacturers use slack wax, which is obtained as a by-product of lube oil refining and has proven to be a cost-effective sizing agent for use in composite wood panels. Slack waxes are available in different grades, and OSB producers, depending on their application needs, will make their selection on the basis of wax composition, oil content, viscosity, melting point or flash point. Slack wax is usually shipped hot from the plant to the OSB mill and is handled and stored at temperatures above its melting point.

Waxes are also available as **wax emulsions**, which contain 50 to 60% water and a small amount of emulsifiers, coupling agents, freeze/thaw stabilizers. The small wax particles found in the emulsion are thought to contribute to better distribution in some cases. Because the product contains water, some attention may be required in the selection/use of resins and the strand moisture content; precautions also need to be taken to prevent the product from freezing. The product is shipped and handled at ambient temperatures and does not need to be heated prior to application.

Waxes are added in the blending process by one of three spray systems: hydraulic, air atomization or spinning disk. The selected method will depend on the type of wax and resin used, the size and geometry of the blender, and the required application rates. The high melt waxes typically used in the OSB industry normally do not contribute much to the total volatile organic compound (TVOC) loading at the press.

For slack wax, ASTM quality control tests are available for congealing point (D938), kinematic viscosity (D445), flash point (D92), drop melt point (D127) and oil content (D721 or D 3235). For wax emulsions, proprietary Q.C. test methods are available for pH determination, oven method solid content and viscosity.

Contact the SBA for further information about these test methods.