

SERVICE LIFE OF ORIENTED STRAND BOARD (OSB)

Occasionally questions are raised about the service life of OSB. The following comments are intended to address this issue.

APA Rated Sheathing Exposure 1, which includes most OSB, is intended for use in protected applications such as floor, roof and wall sheathing. No APA Rated Sheathing Exposure 1 products are intended for applications that call for direct exposure to the outdoor environment. APA-The Engineered Wood Association recommends OSB in a siding application only when it is overlaid by impregnated papers and further protected by coating with paints. These panels will bear an EXTERIOR grade stamp. OSB is a type of wood-based composite that is basically composed of two components: wood furnish and synthetic (e.g. phenolic or isocyanate) adhesive. The synthetic adhesives used in manufacturing OSB are designed for exterior applications, having good water resistance and a high degree of durability. It is well known that wood has a long service life when properly designed, installed and maintained. Therefore, if the bond of OSB is maintained, its service life should be comparable to that of solid wood.

OSB has been in the marketplace for more than 20 years. Outdoor exposure studies by others have shown that if the OSB is maintained and protected properly, there is no reason to expect significant strength loss after many more years of exposure. The major environmental factors affecting the service life of wood and wood-based composites are: 1) ultraviolet (UV) degradation, 2) temperature, 3) fungi attack, and 4) moisture.

1. Ultraviolet (UV) degradation: This is a chemical process in which UV-light and oxygen (photo-oxidation) result in degradation. Because OSB used outdoors (e.g. siding) is protected by coatings, UV will not hurt the OSB panel. However, maintenance of OSB sidings, i.e. re-painting or re-coating, should be conducted periodically to insure that the OSB is not directly exposed.

2. Temperature effect: Research conducted at APA on plywood showed that low temperatures did not affect the panel properties. No effect by a temperature of -68 F (-56 C) was found in plywood bonded with phenolic adhesive. Because the essential elements of plywood are wood fiber and the same synthetic adhesives, there is no reason to assume that OSB would behave differently in terms of cold and heat effect. However, panels should not be exposed to sustained temperatures above 230 F (110 C) because pyrolysis and subsequent charring and weight loss can be expected to result. The thermal expansion of a panel can be neglected compared to hygroscopic expansion or swelling.

3. Fungi attack: Wood-based composites have better decay resistance compared to solid wood. Shi and Wang (1997) conducted soil block tests (AWPA E10-91) comparing the decay resistance of solid wood and wood-based composites. The results indicated that better weight loss performance was obtained for wood-based composites compared to the solid wood. This is because of the higher density of wood composites and the incorporation of synthetic adhesives. When density is high, oxygen and moisture

diffusion into the interior of the substrate becomes more difficult, inhibiting fungi growth. Synthetic adhesives also have a negative effect on the fungi attack. Fungi attack only happens under certain temperature ranges and relative humidity. If the OSB is used properly, by not providing an environment for fungi growth, decay problems can be avoided.

4. Moisture effects: This is the major concern related to the durability of OSB. Moisture content (MC) changes affect the internal structure of OSB due to the swelling and shrinkage of the wood elements. OSB can withstand exposure conditions associated with construction delays prior to providing protection in a similar manner to any wood product, because the MC fluctuation is within a limited range and at a limited number of cycles. The internal stress due to the hygroscopic dimensional change and the fatigue due to the moisture cycles are not high enough to break the bond between wood elements and the overall strength properties of OSB will not be affected. Recommendations are, however, that OSB be used in an in-service environment with no direct contact with water. This is also a requirement of proper building design using any material.

Conclusions

1. The service life of OSB is indefinite (expect 50 years or longer) if it is used and protected properly.
2. OSB should not be used where it is permanently exposed to the outdoor environment unless panels are qualified as Exterior (e.g. siding) and recommended coating is periodically renewed.
3. OSB should not be used in an environment where the in-service temperature is over 230 F (110 C).
4. Good building design, proper architectural detailing, and proper installation and maintenance will help to extend OSB service life.

REFERENCES

- Deppe, H. J. 1981. Long-term comparative tests between natural and accelerated weathering exposures of coated and uncoated wood-based material. Proceeding of the 15th WSU International Symposium on Particleboard. T. M. Maloney, ed. Washington State University, Pullman, WA, pp 79-100.
- O'Halloran, M. R. Plywood in hostile environments: Physical properties and applications. 1975. APA Research Report 132, pp22.
- O'Halloran, M. R. and C. M. Erb, Jr. 1981. Performance-based testing for durability. Proceeding of the 15th WSU International Symposium on Particleboard. T. M. Maloney, ed. Washington State University, Pullman, WA, pp 47-58.
- Shi, Q. and J. Z. Wang. 1997. Utilization of polymer automobile fluff in wood fiberboard. Journal of solid Waste Technology and Management. 24 (4).

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