

These tests compare the durability and performance of lauan plywood typically used in RV construction with that of Azdel Onboard® composite panels. Most tests were performed by certified labs according to standardized testing methods. Several tests specifically utilized Azdel DuraBlend décor adhered to our SuperLite™ composite material.

STAIN & SOLVENT Test

The Stain & Solvent test is used to determine a surface material's resistance to a variety of common and potentially destructive agents. These include water, vegetable oil, coffee, tea, ketchup, mustard, 50% ethyl alcohol, acetone, ammonia, citric acid, red wine, Sharpie marker, #2 pencil, wax crayon and black shoe polish. These substances were applied to and left on sample materials for durations of 1 hour, 2 hours, 4 hours and 16 hours. The effect of each substance was then determined at each interval, with ratings for each ranging from 0-no effect, to 1-moderate effect, to 2 severe effect. Thus, the lower the number, the better the resistance.

The Azdel DuraBlend sample was compared to two other samples: a paper laminate on lauan plywood and vinyl laminate on lauan plywood, each undergoing the same test. The individual ratings were then averaged, yielding an overall value. The lower the average, the more resistant to these agents a material is. These are the results:

DuraBlend / Azdel	0.167
Paper / Lauan	1.200
Vinyl / Lauan	0.450

BURN RESISTANCE per FMVSS-302 / CMVSS-302

Federal (or Canadian) Motor Vehicle Safety Standards – FMVSS 302 specifies the burn resistance requirements for materials used inside motor vehicles such as passenger cars, trucks, buses and agriculture machinery. It was developed to help reduce deaths and injuries to occupants caused by vehicle fires.

The test sample is held horizontally in a U-shaped holder and exposed to a flame for 15 seconds in a combustion chamber, in order to see if/when the flame extinguishes, or the time taken for the flame to pass a defined distance. The burning rate per minute is then calculated. For most automotive applications, a burning rate of no more than 100 mm (3.94") per minute is acceptable.

Results: Azdel DuraBlend Décor tested at 1.85"/min.

ASTM D903 180° PEEL Test

ASTM D903 is a common tensile test used to evaluate the comparative peel or stripping characteristics of adhesively bonded materials when tested under defined conditions of pretreatment, temperature and testing machine speed. The 1" x 8" specimens are peeled away from a substrate at a 180° angle at a separation rate of 152.4mm/min, or 6"/min

Results: For the Azdel DuraBlend, the peel could not be initiated.

SOUND ABSORPTION and SOUND ABSORPTION COEFFICIENTS

Reverberation Room Method ASTM C423, A20 Material sample area = 6.69m², using A-Mount.

Tones emitted separately at 27 frequencies from 31.5Hz to 12500Hz to measure rate of decay as an index. The higher the number the more sound absorbent the material is. The index is represented as the Noise Reduction Coefficient (NRC).

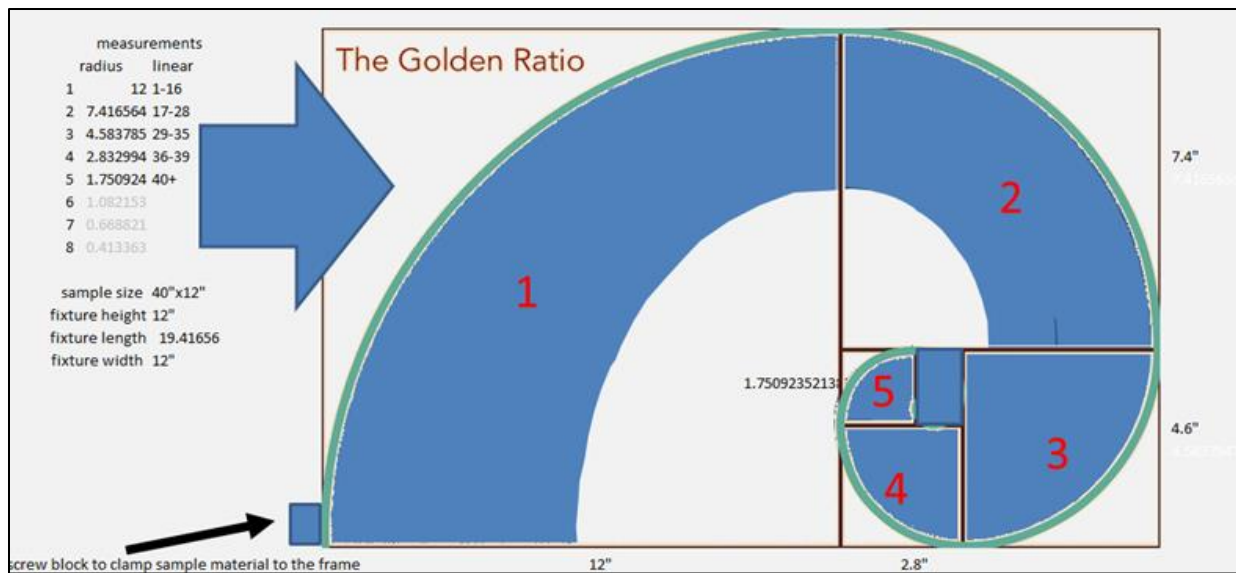
Results: NRC of Lauan = .10 NRC of Azdel SuperLite = .25 NRC of Azdel EcoLite = .25

RADIUS FLEX TEST Using the GOLDEN ARC RATIO

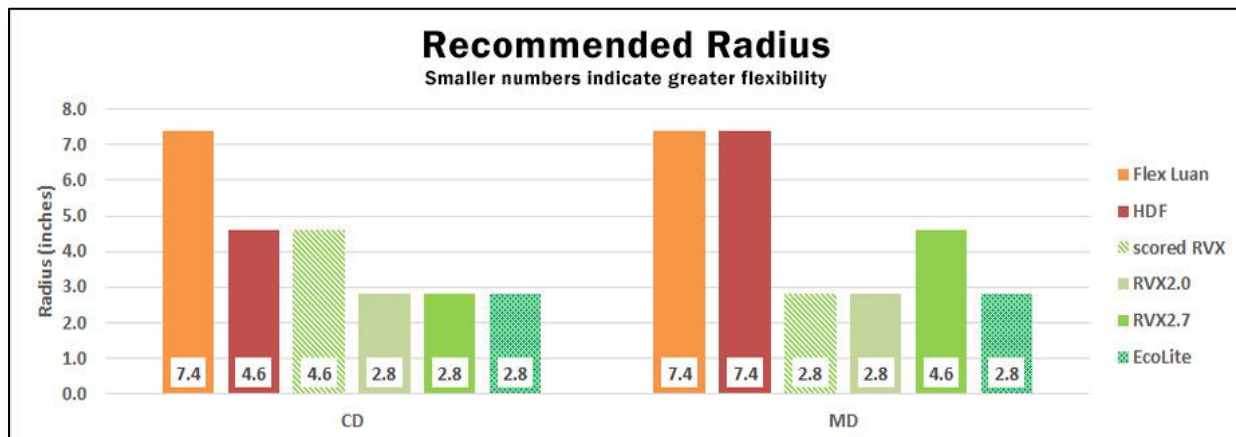
This test is performed to determine the flexibility of roof skins composed of a layer of typical RV FRP adhered to various substrates. The 2.7mm substrates tested include HDF, Bendy Board (flexible lauan), Azdel SuperLite, Azdel SuperLite (scored), and Azdel EcoLite. Each laminated sample is separately affixed to the beginning point of the Golden Arc Ratio apparatus. Pressure is applied to the loose end of the sample to make continuous contact with the apparatus, progressively curving in a tighter radius by a factor of 1.618 until the sample experiences structural failure. The radius achieved is measured at that point. Each sample was tested in its original manufactured direction (MD) and its perpendicular or cross-direction (CD). Results:

	HDF	BB / Lauan	SuperLite	SL Scored	EcoLite
CD	3.7	3.7	2.8	3.3	2.8
MD	6.0	6.0	3.4	2.8	2.8
AVG	4.9	4.9	3.1	3.1	2.8

The numbers written around the test fixture are the values reported as the arc distance (or the length of the skin that exhibits no cracks, wrinkles or other deformations due to flexing. The arc radius rating is in the table on the left and broken down into each of the 5 sub-sections (in red).



This graph illustrates the superior performance that Azdel material options offer in applications requiring flexibility



MOLD GROWTH Test #1

A water soak test is used to compare Azdel composite material with lauan. An equally sized specimen of each is placed into separate jars of equal size. An equal volume of *water is added to both jars. Common road salt is added to simulate real world conditions of salt accumulation from winter or cold weather travel. The lids are tightened and sealed.

Results:

Lauan: black/green mold growth on lauan side in 6 days

Azdel: no visible mold formation after two years

*The type of water used – rain water, tap water or distilled water – had little to no effect on the results.

MOLD GROWTH Test #2

A water soak test is used to compare Azdel composite material with two lauan samples, one laminated to a paper décor layer and the other to a vinyl décor layer. The Azdel sample is laminated to a DuraBlend décor layer. The method in Test #1 is replicated here.

Results:

Paper/Lauan: black/green mold growth on lauan side in 6 days; paper side sparsely covered with white fibrous mold.

Vinyl/Lauan: black/green mold growth on lauan side in 6 days; no visible mold on vinyl at that time

DuraBlend/Azdel: no visible mold growth of any kind on either side

FLAME SPREAD

The National Fire Protection Agency (**NFPA**) has developed a specific set of standards for **Recreational Vehicles**, known as **1192**.

NFPA 1192-2018 6.1.1.1 *Interior finish (as defined in 3.3.35) of walls, partitions, ceilings, exterior passage doors, cabinets, habitable areas, hallways, and bath or toilet rooms, including tub/shower walls, of recreational vehicles shall be of materials with a flame spread index that does not exceed 200 when tested in accordance with ASTM E84 or ANSI/UL723.*

ASTM E84

The American Society for Testing and Materials (ASTM) uses test method E84, commonly known as the *Steiner Tunnel Test*, to determine and rate the surface burning characteristics of building materials. The tunnel test measures how far and how quickly flames spread across the surface of the test sample. The resulting flame spread rating or index is expressed as a number on a continuous scale. The scale for flame-spread is divided into three classes, each with its own index range.

Class I (or A): 0 – 25

Class II (or B): 26 – 75

Class III (or C): 76 – 200

The lower the flame spread index, the less likely a material is to burn itself, or to spread to or ignite other materials. Many inorganic materials such as brick or tile are Class I, while reconstituted wood materials such as plywood, particle board or hardboard are Class III. Unless specially treated, lauan plywood is, at best, Class III. The upper limit of Class III, an index of 200, is the flame spread limit of the RV standard stated above. However, Azdel Onboard composite sheets are Class II (B) rated, with Class I (A) an optional upgrade, offering an even safer alternative to plywood.
