The Doorway

A Publication of The Gill Corporation

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Volume 60 - Number 2 - Spring 2024

TESTING OF HONEYCOMB & PANELS

ANTIMICROBIAL TREATED

The Gill Corporation's (TGC) vertical integration begins with Research and Development combining fibers, resins and additives to create and produce proprietary composite raw materials and products. TGC manufactures metallic and non-metallic honeycomb cores that are one of the fundamental building blocks used by our customers. TGC proprietary prepreg materials are combined with honeycomb core to create sandwich panels. The combinations of TGC raw materials to create composite products are almost endless. Rigorous testing ensures our products meet or exceed customer, industry and TGC requirements.

TGC's commitment to excellence extends across all aspects of our operations, including mechanical testing. Our laboratories utilize state-of-the-art equipment operated by highly skilled chemists, engineers, and professionals to test the multiple levels of raw materials which are combined to create high performance composites. These light-weight products reduce fuel consumption thereby reducing environmental impacts from aircraft, rail, sea and other industrial operations, while still meeting performance requirements.

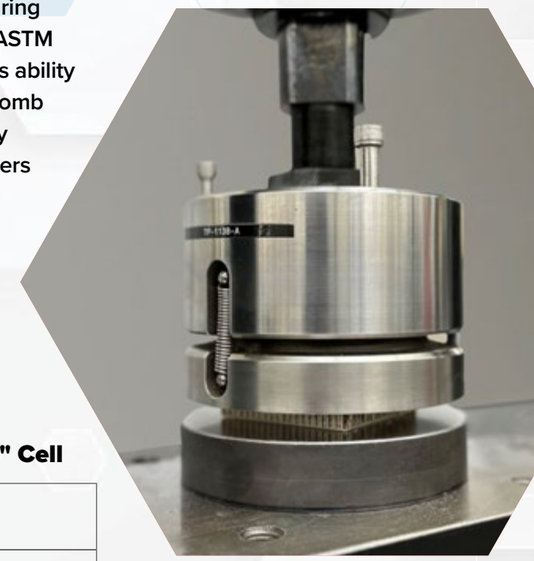
Testing of chemical and mechanical material attributes is necessary to understand the capabilities of materials and products and to confirm they can withstand operational demands as defined by industry or customer specifications. It also generates essential data for our customers' engineers to fine-tune designs that balance strength, weight and cost. Testing continues throughout the lifecycle of our materials and products as TGC continuously seeks to improve the overall benefits of our materials and products as well as design new ones.

HONEYCOMB AND PANEL TESTING

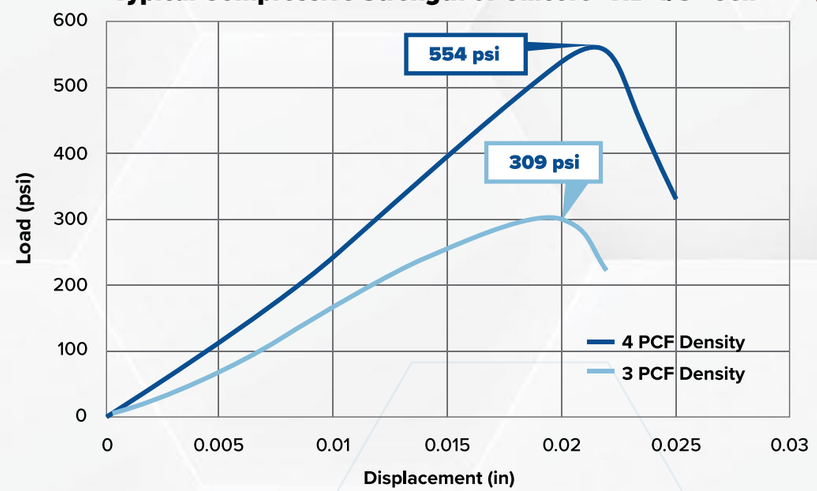
Honeycomb and panel testing is crucial for ensuring the reliability and safety of aircraft components. Such testing involves subjecting the materials to environmental conditions, fatigue, and impact tests. These various test methods ensure that composite materials used in aerospace applications meet required standards, guaranteeing optimal performance and durability in demanding flight conditions.

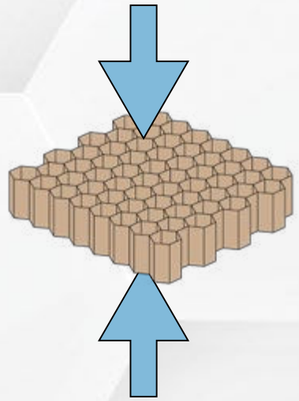
HONEYCOMB COMPRESSION STRENGTH

Compression testing evaluates the structural integrity of honeycomb. Commonly, the test involves applying controlled downward pressure to honeycomb structures, simulating conditions experienced during flight or potential impacts. Engineers employ methods such as ASTM C365 to measure compression strength, analyzing the material's ability to withstand forces. This standardized test ensures that honeycomb structures meet the required safety and performance criteria. By scrutinizing compression behavior, manufacturers and researchers gain insights into the material's resilience, contributing to the continuous enhancement of aircraft design.



Typical Compressive Strength of Gillcore® HD 1/8" Cell

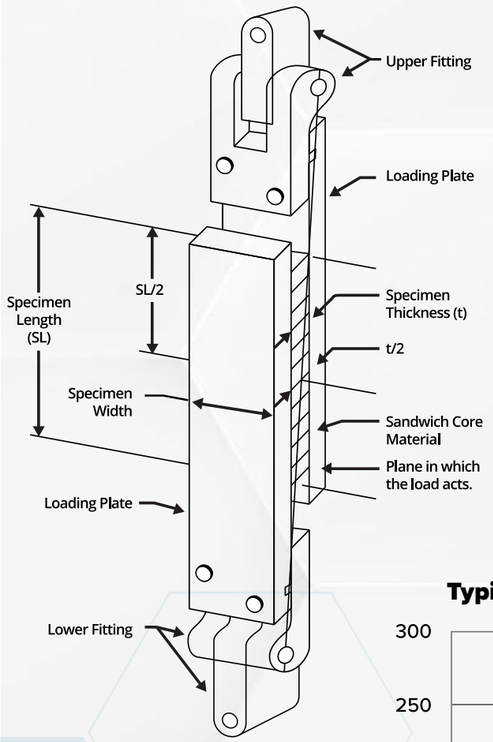


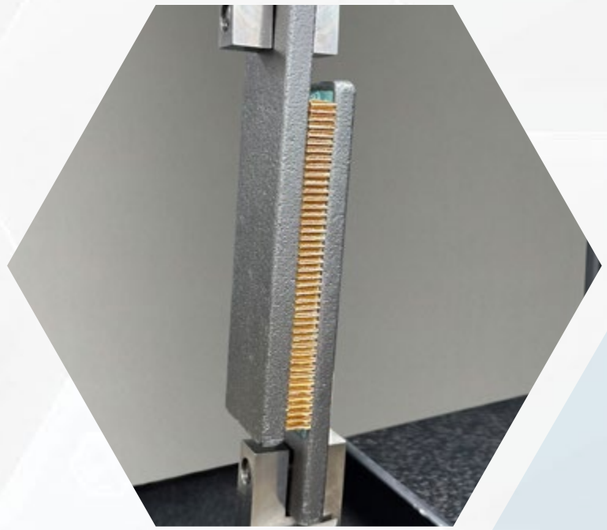


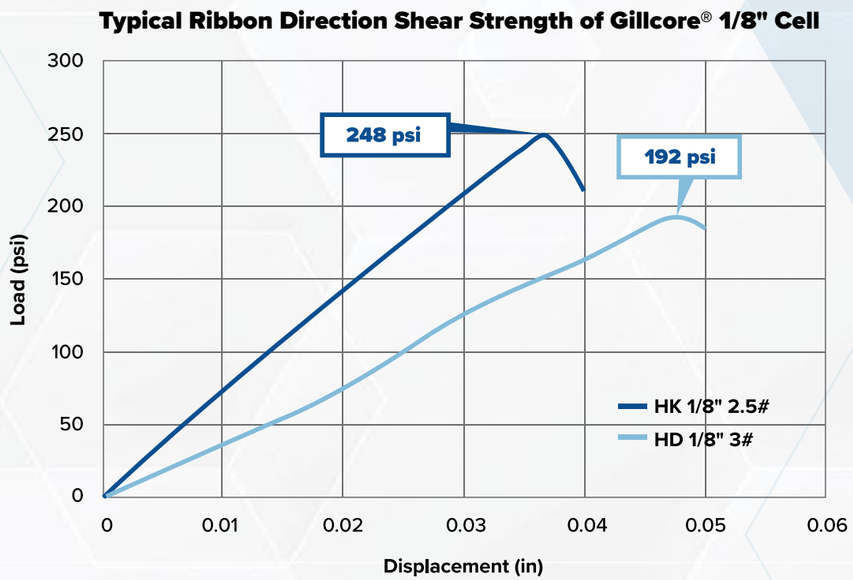
Compression testing is conducted on raw honeycomb core and sandwich panels (depending on the customer spec).

HONEYCOMB CORE SHEAR STRENGTH

Honeycomb shear testing assesses the strength of materials, similar to compression testing. Using standard methods such as ASTM C273, shear tests apply sideways forces to honeycomb structures, imitating what happens during flight or impacts. While compression tests check how well a material handles pressure, shear tests look at how a material handles forces applied sideways. Both tests help us understand how materials behave under different stresses and they ensure the honeycomb structures used in aircraft meet the safety and performance requirements.







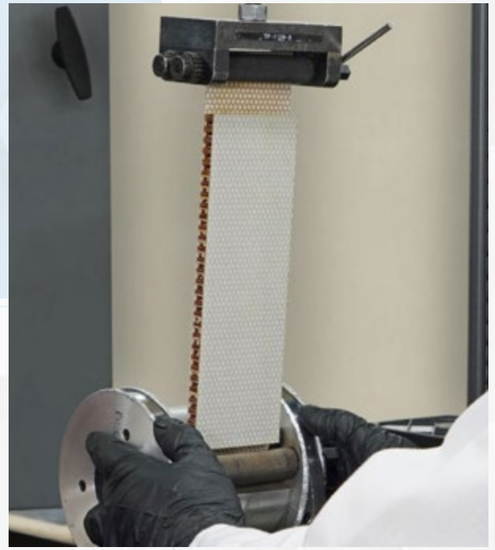
COMPOSITE SANDWICH PANEL CLIMBING DRUM PEEL

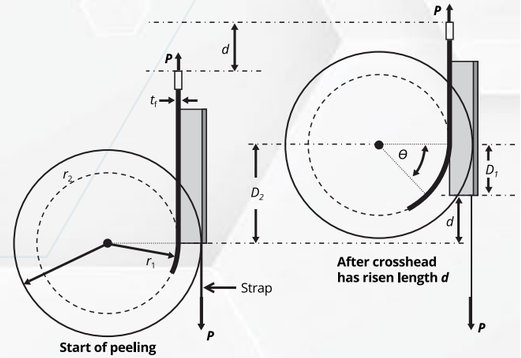
In the realm of composite sandwich panels, the climbing drum peel test evaluates the bonding strength of outer facings to the honeycomb core.

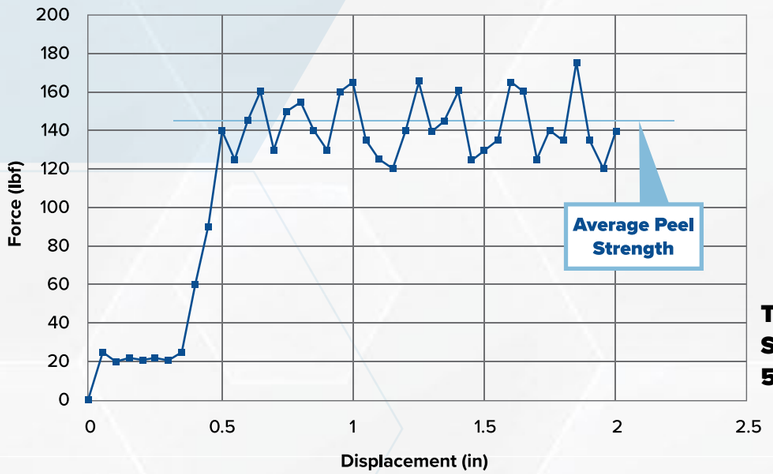
Visualize this testing method as a controlled maneuver resembling the unwinding of layers, similar to peeling an apple, where the specimen is secured onto a rotating drum. The subsequent gradual peeling action replicates the mechanical stresses the panel may undergo during flight.

During the test, engineers observe and measure the force required to initiate and propagate the peeling. The data collected indicates the cohesive strength between the external face sheet and the internal core material. Understanding the bonding strength ensures panels are designed to withstand the dynamic forces associated with aerospace operations.

Precision plays a central role in the climbing drum peel test. Standard test methods, such as ASTM D1781, have guidelines governing specimen dimensions, adhesive formulations, and testing conditions. Using standard methods ensures the accuracy and reliability of the results.







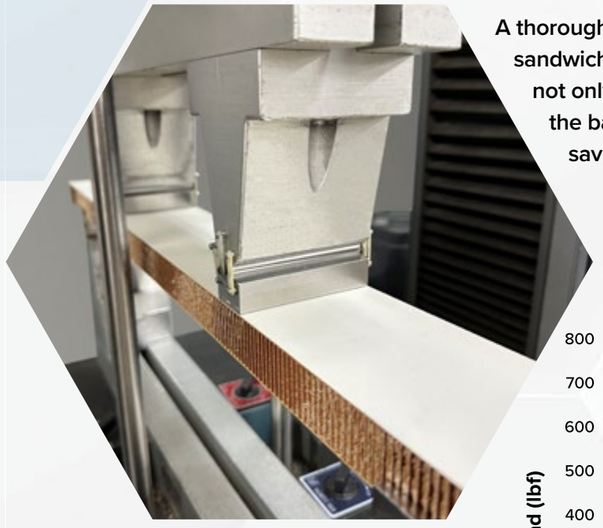
Typical CD Peel Strength of Gillfloor® 5424 Panel

COMPOSITE SANDWICH PANEL BENDING STRENGTH

Bending strength, also known as flexural strength, flexural loading, or long beam bending, measures how composite materials respond to bending loads during flight.

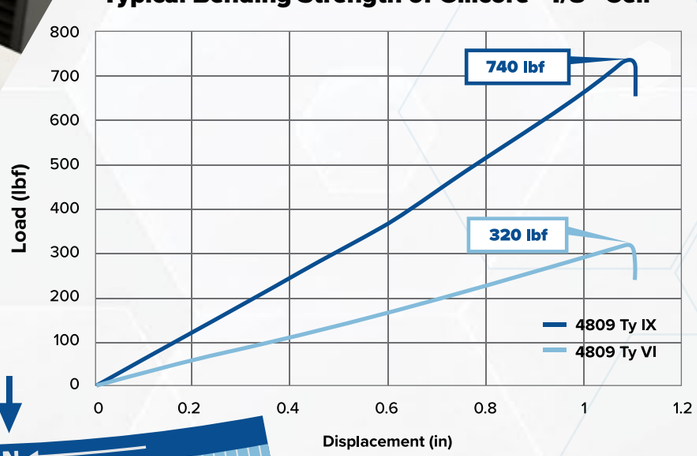
In a bending test, an elongated section of the composite sandwich panel is supported at its ends, similar to a cantilevered beam. A controlled force is applied at the midsection to induce bending. This test replicates the dynamic forces experienced during operating conditions, evaluating the panel's capacity to withstand bending stresses.

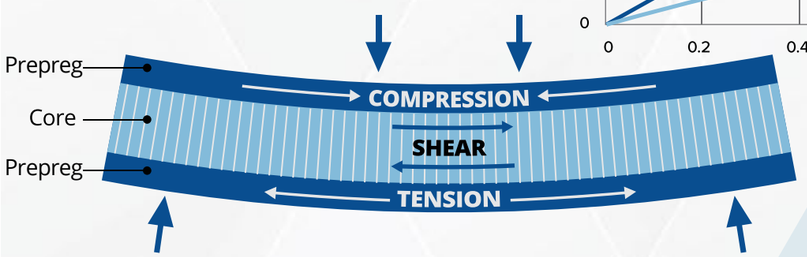
Specialized instruments such as strain gauges and load cells are used for data acquisition during the test. These instruments measure the strains and loads the panel undergoes and provide valuable information about its flexural modulus and strength. Using standardized test methods, such as ASTM D7249, ensures repeatability and consistency in the test.



A thorough understanding of bending strength in composite sandwich panels is important for designing structures that not only withstand the demands of flight but also optimize the balance between material strength and weight savings in aerospace applications.

Typical Bending Strength of Gillcore® 1/8" Cell





FLAMMABILITY TESTING

The burn test is a standard method for flammability testing of materials used in aircraft interiors, both for passenger and cargo areas. This test is designed to evaluate the flame propagation (burn length) characteristics of a material when exposed to a vertical ignition source. In addition, the time required for the flame to self-extinguish is also vitally important. The specifics of the test method are outlined in the Federal Aviation Regulations (FAR) Part 25, section 25.853 for passenger compartments and 25.855 for cargo compartments.

The test is typically done in a chamber that simulates the interior of an aircraft. A flame, with a specified height and temperature, often produced by a Bunsen burner, is applied to the bottom edge of the specimen. The flame is applied for a specific duration, typically 12 seconds, and the specimen is evaluated for the burn length and how long it takes for the flame to self-extinguish.

Materials are classified based on their performance in the vertical burn test. Cargo compartment materials may have different criteria compared to passenger compartment materials, recognizing the different risks and priorities in these areas.

It's important to note that the vertical burn test is just one of several flammability tests used in aircraft material certification. Different tests assess various aspects of fire resistance, smoke production, and toxicity. Compliance with these tests ensures that materials used in aircraft interiors meet safety standards and contribute to the overall fire safety of the aircraft.

TGC MECHANICAL TESTING

These quality tests are just a small subset of TGC's analytical and testing capabilities. In addition to our in-house testing, TGC has strategic partnerships with independent test facilities to perform more extensive specialized testing. These efforts ensure that TGC's products meet or exceed design requirements. Of utmost importance in commercial aviation is the safety of everyone on board. Not only are these tests utilized to ensure the quality of our products, they are also used to improve the reliability, performance, and safety of the next generation of aerospace composites.

Fun Facts

The largest known prime number has 24,862,048 digits. The new prime number is 2 multiplied by itself 82,589,933 times, minus 1.

Forrest Fenn, an art dealer and author, hid a treasure chest in the Rocky Mountains worth over 1 million dollars. It was found approximately a decade later, in 2020.

The lead singer of The Offspring started attending school to achieve a doctorate in molecular biology while still in the band. He graduated in May 2017.

The world's largest grand piano was built by a 15-year-old in New Zealand. The piano is a little over 18 feet long and has 85 keys – 3 short of the standard 88.

The tongue is the only muscle in the body that is attached from one end.

There is a company in Japan that has schools that teach you how to be funny. The first one opened in 1982. About 1,000 students take the course each year.

The Lego Group is the world's most powerful brand. There are more Lego Minifigures than there are people on Earth.

The Bagheera kiplingi spider was discovered in the 1800s and is the only species of spider that has been classified as vegetarian.

There is a boss in Metal Gear Solid 3 that can be defeated by not playing the game for a week; or by changing the date.

The Roman – Persian wars are the longest in history, lasting over 680 years. They began in 54 BC and ended in 628 AD.

Elvis was originally blonde. He started coloring his hair black for an edgier look. Sometimes, he would touch it up himself using shoe polish.

If you translate "Jesus" from Hebrew to English, the correct translation is "Joshua." The name "Jesus" comes from translating the name from Hebrew to Greek to Latin to English.

Ed Sheeran bought a ticket to LA with no contacts. He was spotted by Jamie Foxx, who offered him the use of his recording studio and a bed in his Hollywood home for six weeks.

The voice actor of SpongeBob and the voice actor of Karen, Plankton's computer wife, have been married since 1995.

The first service animals were established in Germany during World War I. References to service animals date as far back as the mid-16th Century.

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