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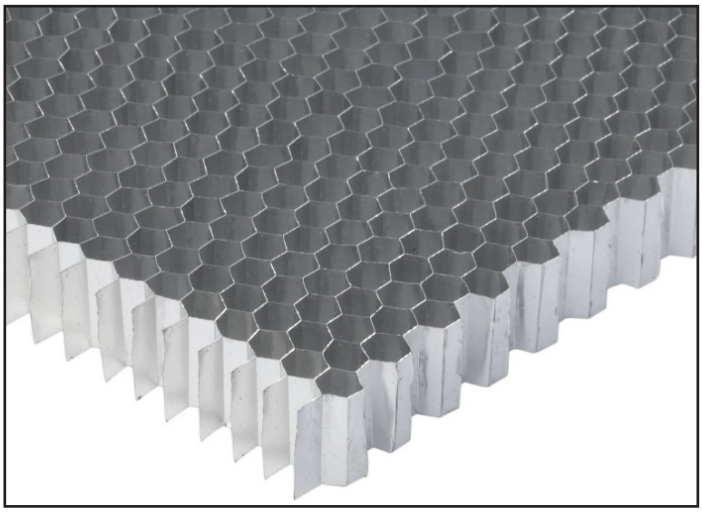
CORE MATERIAL
ALUMINIUM HONEYCOMB



Key Features

- High Shear Strength
- High Compressive Strength
- Low Density
- Corrison & Temperature Resistant
- Accurate Thickness Tolerance

Product Description

High performance aluminium honeycomb core exactly as supplied to the world's top composites engineering, aerospace and motorsport manufacturers. Aluminium honeycomb core is one of the most widely used high performance honeycomb materials; chosen for its excellent strength to weight ratio (the best of all core materials) and bonding characteristics.

Aluminium honeycomb is used extensively in the motorsport, marine and aerospace industries and increasing now in construction industry where reducing weight whilst maintaining or improving the strength of a composite is of key importance.

In its un-expanded (block) form aluminium honeycomb is also very compact and easy to ship cost effectively and without risk of damage. Un-expanded blocks can be easily expanded into their full sheet form without the need for sophisticated equipment. Sheets are available in blocks which will expand to a full sheet size of 2500mm x 1250mm or to a smaller sheet size of 1250mm x 652mm.

Like all core materials aluminium honeycomb is designed to be sandwiched between two skins of material to create a sandwich panel. By creating distance between the two skins and ensuring that these skins cannot move relative to each other great mechanical advantage is gained making for very stiff panels with only minimal increase in weight.

Recommended Uses

Aluminium honeycomb is used in a wide range of applications, including:

- Motorsport (monocoques, splitters, floors, diffusers, crash cells)
- Aviation (bulkheads, dashboards, floors)
- Marine (decks, bulkheads, dashboards)
- Renewable energy (turbine housings, blade construction)
- Architectural (panels, doors, floors)
- Mass transit
- Crash attenuation (impact cells for crash tests, crumple zones)
- Air straighteners (wind tunnels)
- Laser cutting beds

Specification & Properties

The following table lists the specification and properties for the different cell sizes of honeycomb we supply.

Property	1/8" (3.2mm)	1/4" (6.4mm)	3/4" (19.1mm)
Nominal Density	72.1 kg/m^3	83.3kg/m^3	28.8kg/m^3
Aluminium Series	5052	3003	3003
Foil Thickness (micron)	35	70	50
Perforated?	No	Yes	Yes
Corrosion Treated	No	Yes	Yes
Comp Strength - Bare	539 psi	625 psi	115 psi
Comp Strength - Stabilised	559 psi	655 psi	125 psi
Crush Strength	255 psi	235 psi	40 psi
Plate Shear (L dir.) Strength	340 psi	360 psi	95 psi
Plate Shear (L dir.) Modulus	70 ksi	65 ksi	22 ksi
Plate Shear (W dir.) Strength	220 psi	210 psi	60 psi
Plate Shear (W dir.) Modulus	31 ksi	35 ksi	10 ksi
Max Service Temperature	120 °C	120 °C	120 °C

Expanding the Honeycomb

IMPORTANT - wear gloves before handling the block.

Commonly Aluminium Honeycomb is supplied as an unexpanded block. This is for two reasons, firstly because expanded honeycomb would be expensive to ship, and secondly because in its expanded un-stabilised form, the honeycomb is very susceptible to damage and would unlikely survive transport intact.

In large scale manufacturing, a specialist expanding machine is used to expand the honeycomb. However, for smaller applications and one off jobs, such machinery is prohibitively expensive and large thus an alternative method is needed.

Equipment needed

You will need 2 wooden battens, both as wide as the sheet you are expanding and stiff enough not to flex too much. 2" by 4" wooden battens are usually ideal and easily obtained. You will also need a bag of wood nails. They need to be long enough so that they can go through both the wooden batten and still protrude enough to go through the honeycomb.

For cutting honeycomb you need a steel ruler and a sharp Stanley type knife with a blade long enough to cut through the honeycomb to its full thickness in one go.

Making tools to aid expansion

Take one of the battens and mark out a series of dots on the wood along the battens length spaced at approximately 50mm intervals.

Once marked, hammer the nails through the dots marked on the batten (taking care nothing is underneath!). The final result should be a batten with regular nails poking through.

Repeat for the second batten so you have two identical battens with nails sticking out.

You now just need a flat surface to work on and an assistant to help you expand the honeycomb.

Expanding the honeycomb

The first step is to lay the honeycomb onto a flat surface and by hand tease out gently the first few cells. Take care as you work across the sheet to ensure you do not pull too much out in one go as otherwise the honeycomb will kink making it harder to work.

The reason for expanding the first few cells by hand is to give the nails enough material to pull out the sheet without just ripping through the cells at the edge. The sheets are deliberately cut oversize to allow a little waste at each end due to expansion.

Repeat on the other side of the honeycomb.

At this stage you will need an assistant. Insert the batten tools into each side of the honeycomb. With one person holding each batten, slowly apply tension to expand the honeycomb.

If you find it is just ripping through the cells you have teased out by hand, then stop, pull out a few more cells by hand then start the process again. Expect the cells at the edge to distort and stretch as the sheet expands.

As you build up tension the honeycomb will begin to expand. Be careful you don't put on too much force and distort excessively the honeycomb as it expands. Gentle but firm is the method to use.

Continue to apply the tension to the battens to expand the whole sheet, taking care as it expands to keep the sheet as straight as possible. Once you are happy the honeycomb has been expanded sufficiently, then you can remove the battens and then use the honeycomb for your project.

Cutting the honeycomb

You will need a sharp Stanley type knife and a metal ruler. The blade needs to be long enough to cut the cell foils in one action for the chosen thickness of honeycomb.

The method is relatively simple. Measure the sheet out and use the metal rule as the cutting edge. Working from one side of the planned cut, individually cut through each cell foil from top to bottom using the knife. You need to ensure each foil is fully cut before moving onto the next one, so that when you try to separate the honeycomb, it comes apart neatly and doesn't catch or distort the cells.

Do not attempt to cut across the honeycomb in one go as it is easy to tear and distort the cells as you drag the knife blade across the honeycomb.

Disclaimer

This data is not to be used for specifications. Values listed are for typical properties and should not be considered minimum or maximum.

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