



HexWeb® HRH-10

Aramid Fibre/Phenolic Honeycomb



Product Data Sheet

Description

HexWeb® HRH-10 is manufactured from aramid fibre sheets. A thermosetting adhesive is used to bond these sheets at the nodes, and, after expanding to the hexagonal or OX-Core® configuration, the block is dipped in phenolic resin. After curing the resin, slices are cut to the desired thickness. Using this process, a wide range of cell sizes, thicknesses, and densities can be produced. The standard product range is shown under Mechanical Properties, other products may be available on request.

Features

- High strength at low densities
- Small cell sizes at low densities
- Damage resistant under normal shop use
- Formable
- Fire-resistant (self-extinguishing)
- Water and fungus resistant
- Excellent dielectric properties
- Good bonding surfaces
- Good thermal and electrical insulator

Applications

HexWeb® HRH-10 has been widely accepted throughout the aerospace industry and several commercial areas as a very tough, environmentally resistant core material in sandwich panels. It has been designed and used in flat and contoured shapes, with a wide variety of facing materials and adhesives, and it has extensive service in both structural and nonstructural parts. Most of the interior panels of commercial aircraft are made with this core material primarily because of its resilience, small cell size/low density combination, and its fire resistance. Exterior aircraft parts such as radomes, fairings, helicopter blades, flaps, etc., are designed with HRH-10 because of the features listed above. Surfboards and high-performance boats are but two additional applications where this core has been used because of its toughness and resistance to corrosive attack. The OX configuration is a hexagonal honeycomb that has been overexpanded in the W direction, providing a rectangular cell shape that facilitates curving or forming in the L direction.



Standard Dimensions

HexWeb® HRH-10 honeycomb is typically available in the following sizes.

Products	L (+/-50 mm)	W (+/-100 mm)	T maximum	T minimum	m ² per Panel
All HRH-10 Materials	1250	2500	850 mm	2 mm	3.125

Thickness Tolerance

Tolerances on cut thickness are as follows:

3 to 50mm tolerance will be $\pm 0.125\text{mm}$

50 to 100 tolerance will be $\pm 0.25\text{mm}$

100mm and over tolerance will be $\pm 3.0\text{mm}$

Tolerance for block purchases will be $\pm 50.0\text{mm}$

Different L, W & T tolerances may be available upon special request, subject to review. For large volume requirements it may be possible to supply sheets to your specific size at little or no additional charge. Please be aware tight tolerances are not always possible because of the flexible nature of this material.

Type Designation

HexWeb® HRH-10 honeycomb is designated as follows:

Material – Cell Size – Density

Example: HRH-10 – 3.2 – 48 (xxx)

Where:

HRH-10 - designates honeycomb type

3.2 - is the cell size in mm

48 - is the nominal density in kg/m^3

(xxx) - additional information

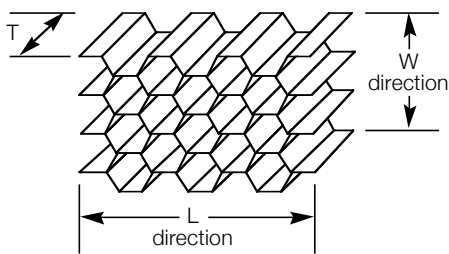
Dimensional Nomenclature

T = Thickness

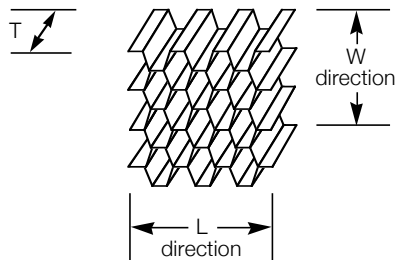
L = Length in the ribbon direction

W = Width in the direction of expansion, or direction perpendicular to the ribbon

Hexagonal Cell



Overexpanded Cell





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Availability

HexWeb® HRH-10 will be shipped from Duxford, UK or Casa Grande, Arizona, USA. Lead times will vary with particular core types selected. Contact the nearest Hexcel Sales Office for further information.

Special Configuration and Shapes

Honeycomb cores can be custom designed with nonstandard mechanical property combinations to meet a variety of special applications. In addition to the hexagonal and overexpanded (OX) cell shapes, HexWeb® HRH-10 is available in Flex-Core®, a very flexible core material. (See Flex-Core® Data Sheet DS3700.) HexWeb® HRH-10 can be provided machined or formed to your specific requirements, including flat pieces cut to size, simple tapers, edge chamfering, doubler reliefs, or machining to complex and compound curvatures. Hexcel has unique capabilities to machine parts to unusual contours and to shape honeycomb by a variety of heat-forming techniques. Contact the nearest Hexcel Sales Office for additional information.

Specifications

HexWeb® HRH-10 has been evaluated and approved for numerous specifications. In addition, HexWeb® HRH-10 meets the following parameters and properties:

Configuration - The cell size of hexagonal core will give the nominal cell dimensions in mm across the flats (nodes) of the cell. Cell size determination will be made by measuring the length of 10 consecutive cells in 6 random locations and averaging the results. Visual defects (offset sheets, double layers, localised cell distortion, nodal delamination, colour variation, resin coat uniformity and surface finish) are inherent to the process and allowable defects as long as density and mechanical properties are obtainable. Anything considered significant or potentially prejudicial will be communicated in advance of delivery for assessment.

Density - The tolerance on honeycomb density, when measured on a minimum of 1640 cm³ of core, will be $\pm 10\%$.

Flame Retardance - HexWeb® HRH-10 will meet the "self extinguishing" classification of FAA Air Crash Worthiness Rules and Regulations Section 25.853.*

Water Migration - Does not exceed one cell water migration in 24 hours when tested per MIL-STD-401B.

Mechanical Properties - The table on the next page lists the HexWeb® HRH-10 product line and mechanical properties when tested per MIL-STD-401B using 12.7mm core thickness. The typical values represent the mean average of a relatively large number of test values obtained from many blocks of honeycomb.

**Not included in standard release testing. Qualification testing only.*



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Mechanical Properties of HexWeb® HRH-10 at Room Temperature

Hexcel Honeycomb Designation Material – Cell Size – Density		Compression			Plate Shear			
		Bare	Stabilised		L Direction		W Direction	
		Strength MPa	Strength MPa	Modulus MPa	Strength MPa	Modulus MPa	Strength MPa	Modulus MPa
		typ	typ	typ	typ	typ	typ	typ
Hexagonal	HRH-10-3.2-29	0.64	0.79	55	0.62	26	0.34	10
	HRH-10-3.2-48	2.07	2.24	138	1.21	41	0.69	24
	HRH-10-3.2-64*	3.3	3.97	193	1.76	59	0.97	32
	HRH-10-3.2-80	4.8	5.31	255	2.24	70	1.21	37
	HRH-10-3.2-96	6.6	7.76	414	2.66	90	1.38	45
	HRH-10-3.2-123	10.60	11.30	500	3.10	105	1.70	60
	HRH-10-3.2-128	11.55	12.62	538	3.31	110	1.79	66
	HRH-10-3.2-144	13.79	14.48	621	3.55	121	2.07	76
	HRH-10-4.8-32	1.00	1.05	76	0.76	30	0.41	14
	HRH-10-4.8-48	2.07	2.24	138	1.21	45	0.69	23
	HRH-10-4.8-64	3.45	3.72	193	1.69	54	0.97	32
	HRH-10-4.8-72	4.40	4.50	250	2.30	75	1.20	35
	HRH-10-4.8-96	6.45	7.03	414	2.90	90	1.55	45
	HRH-10-6.4-24	0.55	0.62	41	0.48	21	0.24	9
	HRH-10-6.4-32	0.97	1.07	76	0.72	28	0.34	14
	HRH-10-6.4-50	1.97	2.14	145	1.28	45	0.62	21
	HRH-10-6.4-64	3.03	3.31	193	1.72	55	0.86	24
	HRH-10-9.5-24	0.66	0.72	41	0.48	21	0.24	10
	HRH-10-9.5-32	0.97	1.07	76	0.62	26	0.38	17
	HRH-10-9.5-48	2.00	2.21	117	1.28	39	0.66	24
OX-Core	HRH-10/OX-4.8-29	0.76	0.83	48	0.45	14	0.48	21
	HRH-10/OX-4.8-48	2.21	2.41	117	0.79	21	0.93	41
	HRH-10/OX-4.8-64	4.14	4.48	179	0.90	32	1.03	58
	HRH-10/OX-6.4-48	2.41	2.66	117	0.76	21	0.93	41

Bold print indicates products which are readily available from stock.

As standard, only bare compression will be used for release

*Manufactured with various raw material configurations, mechanical properties vary accordingly



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Additional Information

The following properties of HexWeb® HRH-10 were obtained on representative production materials.

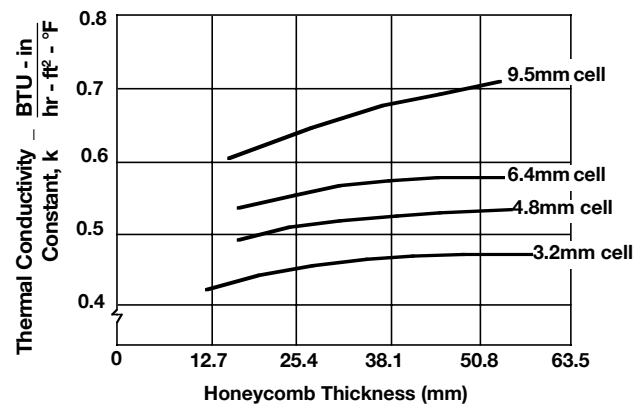
Dielectric Constant

The dielectric constant of a few core types has been measured at a frequency of 9375 MHz. Polarization parallel to both the L and W direction was used.

Core Density kg/m ³	Polarization Parallel to L		Polarization Parallel to W	
	E Parallel L	E Parallel W	E Parallel L	E Parallel W
24	1.09	1.09	1.04	1.03
32	1.10	1.10	1.05	1.04
48	1.11	1.11	1.07	1.05
64	1.13	1.13	1.10	1.07
80	1.15	1.15	1.14	1.09
96	1.19	1.19	1.18	1.11

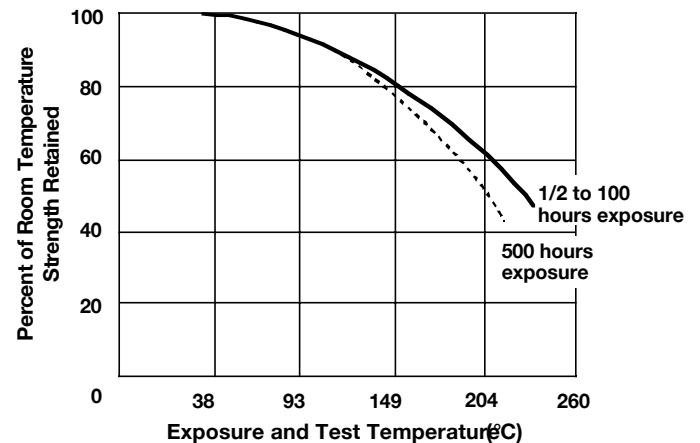
Thermal Conductivity

Several honeycomb cores have been tested for thermal conductivity. The figure to the right shows the results of this evaluation for HexWeb® HRH-10. The thermal conductivity constant varies with cell size and core thickness because the air convection affects inside the cells. Note the following values were obtained with the heat flow from top to bottom of the panel.



Properties at Elevated Temperatures

HexWeb® HRH-10 has been tested for shear and compressive strength at elevated temperatures and time exposures up to 500 hours. Because the Nomex softens between 230 to 260°C, the properties drop off rapidly at those temperatures; however, when returned to ambient conditions, most of its original strength is retained.





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For more information

Hexcel is a leading worldwide supplier of composite materials to aerospace and industrial markets. Our comprehensive range includes:

- HexTow® carbon fibers
- HexForce® reinforcements
- HiMax™ multiaxial reinforcements
- HexPly® prepregs
- HexMC® molding compounds
- HexFlow® RTM resins
- Redux® adhesives
- HexTool® tooling materials
- HexWeb® honeycombs
- Acousti-Cap® sound attenuating honeycomb
- Engineered core
- Engineered products

For US quotes, orders and product information call toll-free 1-888-611-4038. For other worldwide sales office telephone numbers and a full address list, please go to:

<http://www.hexcel.com/contact/salesoffice>

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