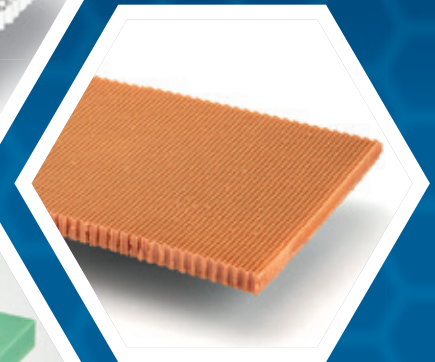
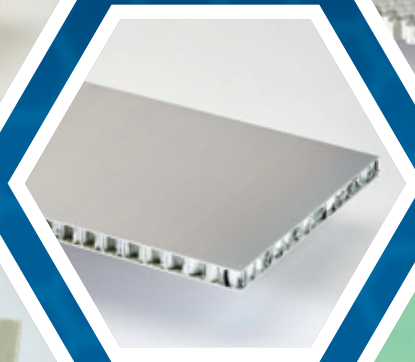
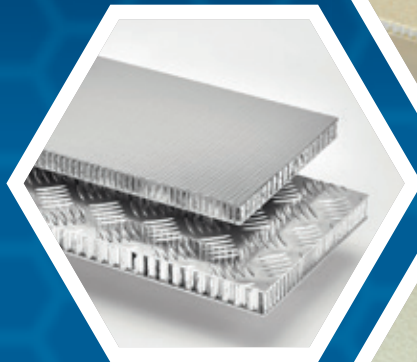
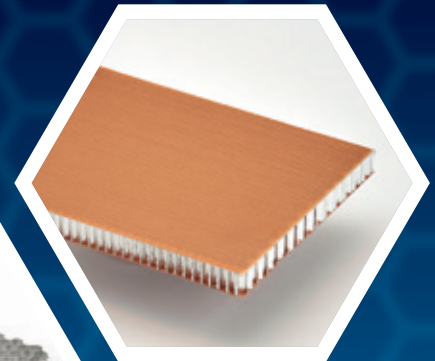
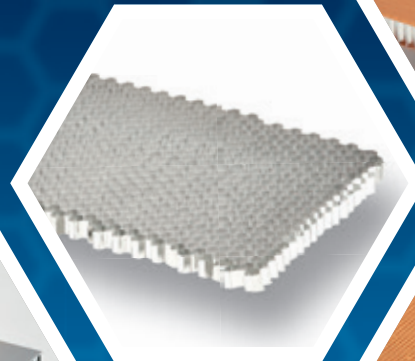
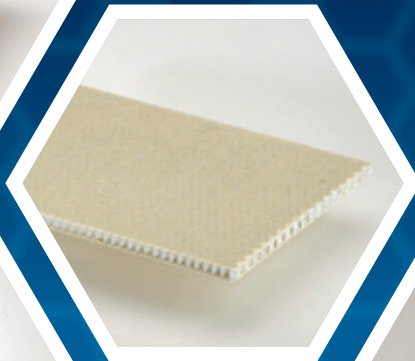
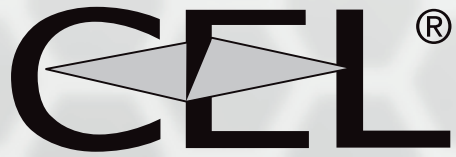


## **SANDWICH PANELS AND HONEYCOMB**





**SANDWICH PANELS AND HONEYCOMB**



## **The company**

CEL supplies honeycomb cores and sandwich panels with applications in many different sectors:

- Marine: Shipyards and yachts (furniture, floorings, bulkheads, etc.)
- Railway: Railcars (floorings, partitions, ceilings, etc.)
- Automotive: Crash absorbers
- Clean Rooms
- Buildings (continuous facades, elevator cabins, etc.)
- Interiors (furniture, walls, etc.)
- Support for natural and engineered stone (marbles, semi-precious stones, mosaics, etc.)
- Lighting: Anti-reflection and dimming systems
- Refrigeration and air deflection
- Vacuum tables

## About us

In our 25 years of experience, we have developed high standards and technical expertise in international markets.

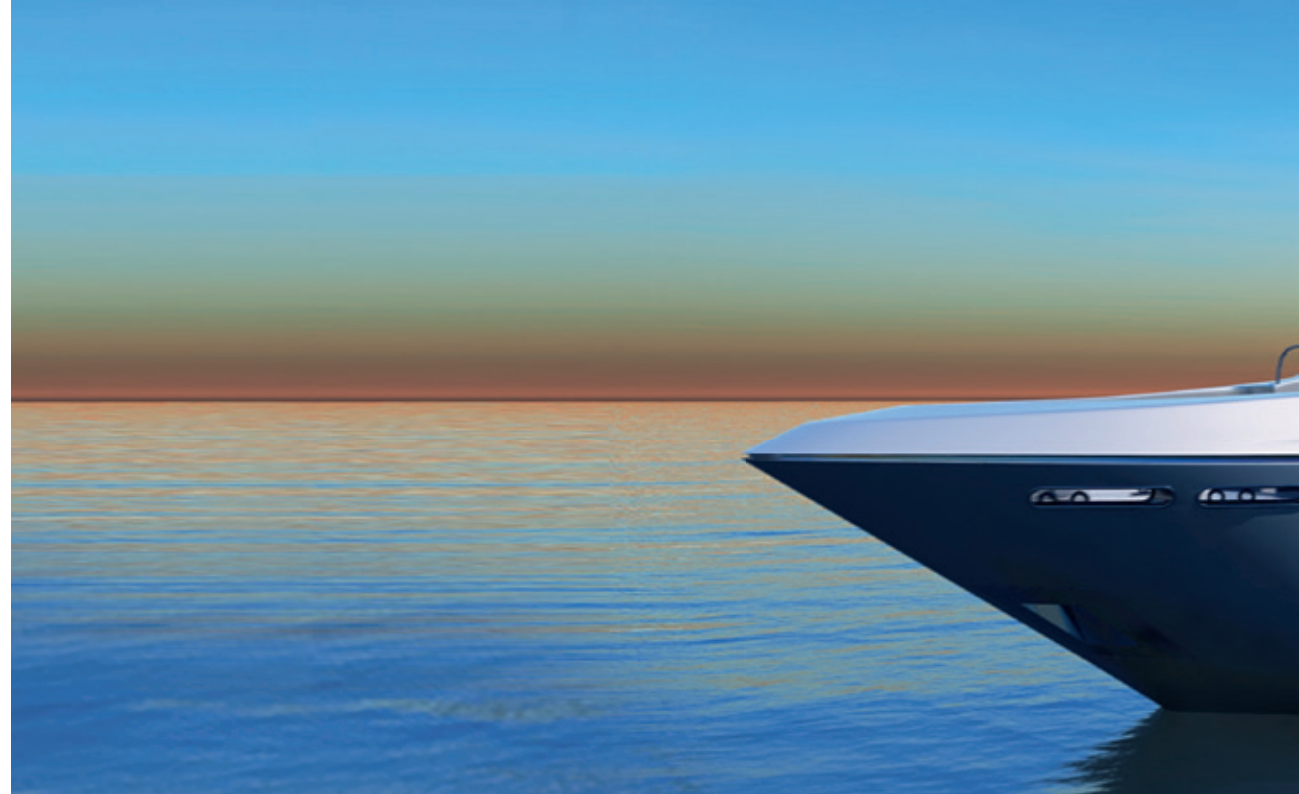
The corporate organizational model is structured for autonomy and flexibility: from production to logistics, sales and purchasing.

Our team is dynamic, young, motivated, customer-oriented and diverse and we offer service in many languages.



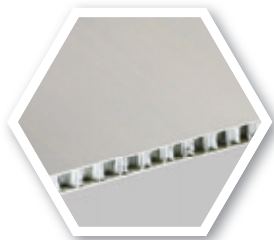
## Shipyards and Shipbuilding

Honeycomb cores and sandwich panels are used in shipyards to reduce the weight of structures, fixtures and furniture, while maintaining the integrity and mechanical properties. The panels can be used in many applications: partitions, interiors, furniture, ceilings, and floor systems for engine rooms. In particular, CEL's aluminium honeycomb and COMPOCEL AL FR\*, ALUSTEP F\* and ALUSTEP FN\* sandwich panels obtained IMO MED Certification Mod. B and D according to FTP Code 2010.



### COMPOCEL SANDWICH PANELS:

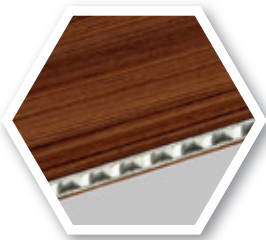
### ALU/POLISTEP PANELS:



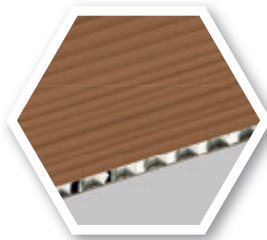
**COMPOCEL AL**  
**COMPOCEL AL FR\***  
Skins: aluminium.



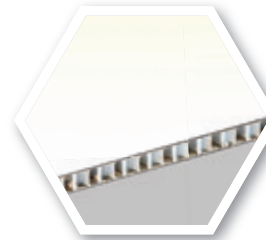
IMO MED CERTIFICATION  
MOD. B and D  
USCG 164.112



**COMPOCEL H**  
Skins: high pressure laminate.



**COMPOCEL ALH\***  
Faced on one or both sides with decorative laminate. Upper and lower skin in raw aluminium.



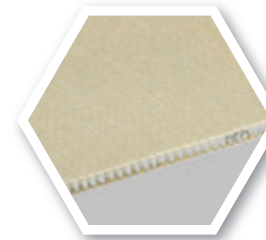
**COMPOCEL HP**  
Skins: high pressure laminate.



**COMPOCEL W**  
Skins: plywood.



**COMPOCEL WP**  
Skins: plywood.



**SERIE ALUSTEP**  
Skins: fibreglass impregnated with epoxy resin.

ASSESSMENT OF RESISTANCE TO  
IMPACT ACCORDING TO  
THE NORM ISO 4211-4: 1988



FLOOR PANELS:

HONEYCOMBS AND FOAMS:



**ALUSTEP F \***

Skins: fibreglass impregnated with phenolic resin.



IMO MED CERTIFICATION  
MOD. B and D  
USCG 164.112

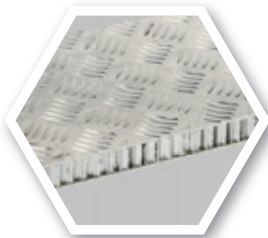


**ALUSTEP FN\***

Skins: fibreglass impregnated with phenolic resin.



IMO MED CERTIFICATION  
MOD. B and D  
USCG 164.112

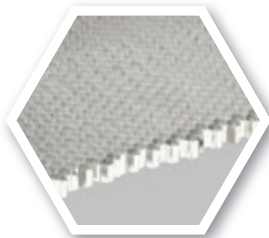


**COMPOCEL FLOOR**

Upper face anti-slip coatings.  
Lower skin: raw aluminium.



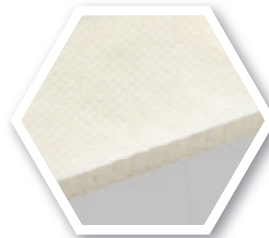
IMO MED CERTIFICATION  
MOD. B and D  
USCG 164.112



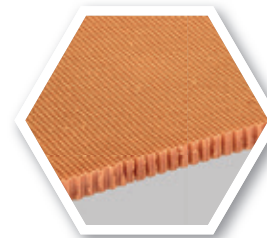
**ALUMINIUM**



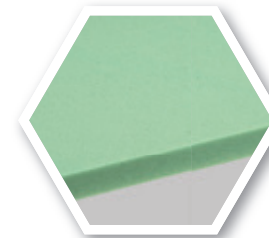
IMO MED CERTIFICATION  
MOD. B and D  
USCG 164.109



**POLYPROPYLENE**



**ARAMID PAPER**



**PVC - PET - PIR**

\* Certified products must be required in advance and might have a price surcharge due to certified materials.

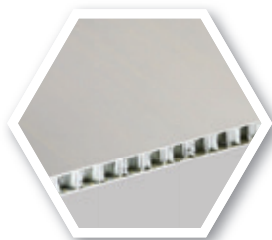
# Railways

In the railway sector, CEL COMPONENTS' lightweight panels are used as partitions, ceilings, floors, bulkheads, tables, etc. These lightweight panels are generally composed of three layers: a core in aluminium or aramid paper honeycomb bonded with two skins either in aluminium, high pressure laminate or fibreglass.



## COMPOCEL SANDWICH PANELS:

## HONEYCOMBS:



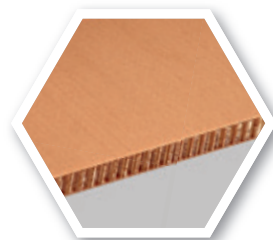
**COMPOCEL AL**  
**COMPOCEL AL FR\***  
Skins: aluminium.

CLASSIFICATION  
HL3 for R1 - R2 - R10  
ACCORDING UNI EN 45545-2



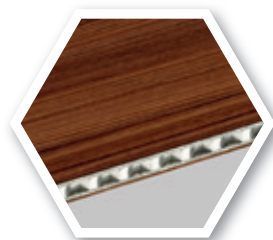
**ALUSTEP F \***  
Skins: fibreglass impregnated  
with phenolic resin.

CLASSIFICATION  
HL3 for R1 - R2 - R10  
ACCORDING UNI EN 45545-2

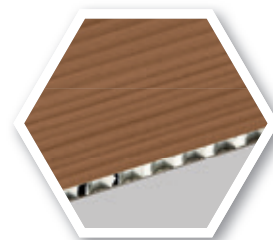


**ALUSTEP FN\***  
Skins: fibreglass impregnated  
with phenolic resin.

CLASSIFICATION  
HL3 for R1 - R2 - R10  
ACCORDING UNI EN 45545-2

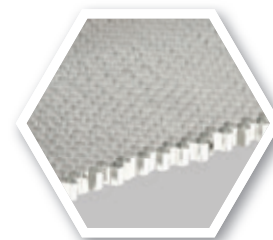


**COMPOCEL H**  
Skins: high pressure  
laminate.

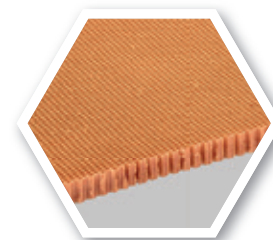


**COMPOCEL ALH\***  
Faced on one or both sides  
with decorative laminate.  
Upper and lower skin in raw  
aluminium.

ASSESSMENT OF RESISTANCE  
TO IMPACT ACCORDING  
TO ISO 4211-4: 1988



**ALUMINIUM**



**ARAMID PAPER**



According to the norm UNI-EN 45545-2:2015 Aluminium Sandwich panel COMPOCEL AL FR\*, ALUSTEP F\* and ALUSTEP FN\* obtained Class HL3 (maximum safety limit set) for R10. COMPOCEL AL FR\* obtained HL3 also for R1 and R2. ALUSTEP F\* and FN\* obtained class HL2 for R1 and R2.



The HL3 parameter ensures that the panels conform to the requirements for self-extinguishment of material, low fume toxicity and opacity. Therefore, the achievement of class HL3 permits COMPOCEL AL FR\* to be used in floors, ceilings, separating walls in railcars.

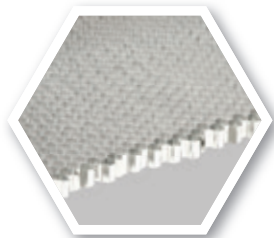
\* Certified products must be required in advance and might have a price surcharge due to certified materials.

## Automotive

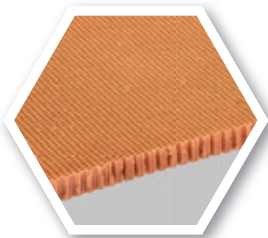
Several CEL COMPONENTS' products have applications in the automotive sector. As they absorb kinetic energy, both honeycomb cores and sandwich panels are used as shock absorbers. In particular, CEL COMPONENTS' thick aluminium honeycomb, encapsulated in a metal box, is positioned either in the front or the back of vehicles and absorbs energy in case of a crash.



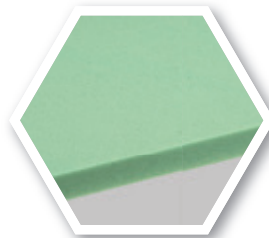
### HONEYCOMBS AND FOAMS:



**ALUMINIUM**

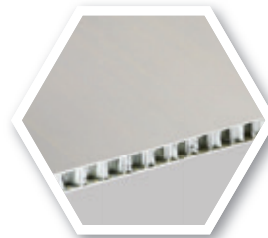


**ARAMID PAPER**

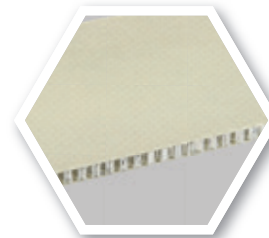


**PVC - PET - PIR**

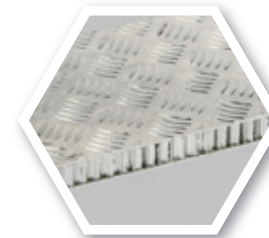
### SANDWICH PANELS:



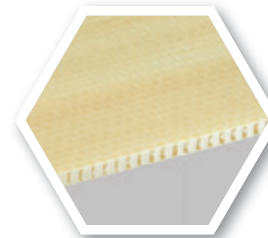
**COMPOCEL AL**  
Skins: aluminium.



**SERIE ALUSTEP**  
Skins: fibreglass  
impregnated with epoxy  
resin.

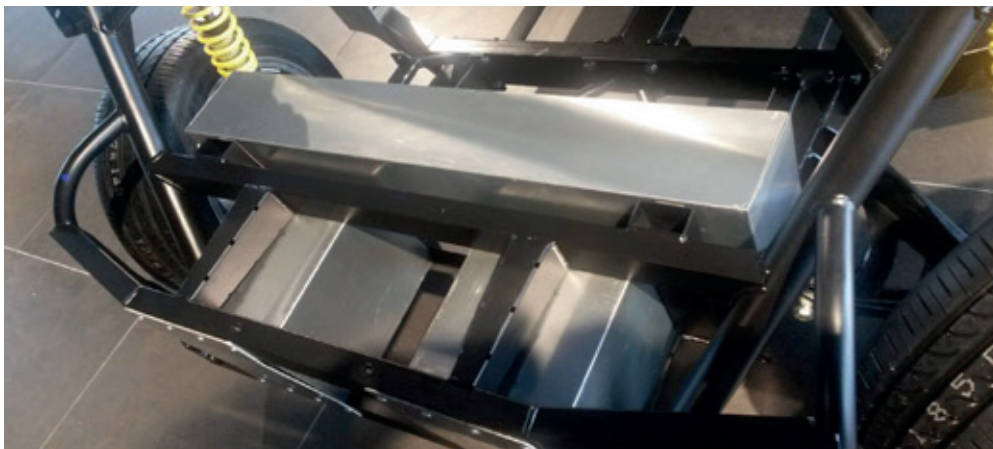


**COMPOCEL AL FLOOR**  
**COMPOCEL AL FR FLOOR\***  
Upper face chosen among different  
antiskid/ anti-slip coatings.  
Lower skin: raw aluminium.

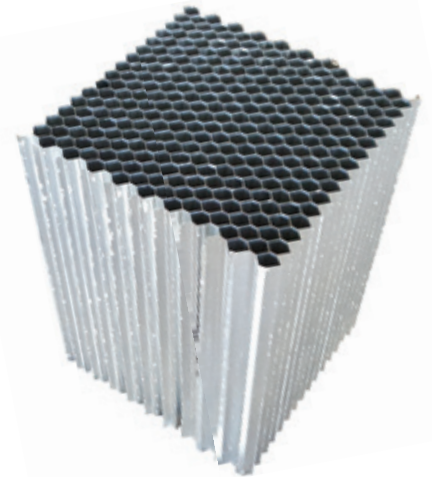


**POLISTEP**  
Skins: fibreglass  
impregnated with epoxy  
resin.





Aluminium and aramid paper honeycomb cores are also used in composite panels destined for use in the vehicle platform (e.g. the underside of the vehicle).

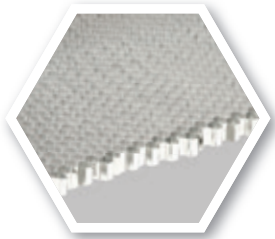


## Cleanrooms

Cleanrooms are uncontaminated areas used for scientific purposes, such as laboratories of various kinds (chemical, mechanical, opto-electronical), where airborne micro particles, environmental pollutants and microbes must be greatly reduced. CEL COMPONENTS' sandwich panels for clean rooms are generally made of an aluminium honeycomb core bonded with two skins of high pressure laminate or aluminium; they can be painted with anti-static ESD if specifically requested. These panels are normally used in walls, doors, floors, and ceilings.



HONEYCOMBS:



**ALUMINIUM**

COMPOCEL SANDWICH PANELS:



**COMPOCEL AL FR\***

Skins: aluminium.



**COMPOCEL H**

Skins: high pressure laminate.



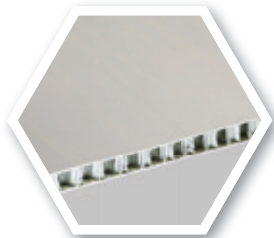


## Interiors

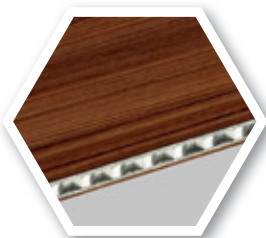
CEL COMPONENTS' sandwich panels are highly appreciated by designers. Ultralight, with outstanding dimensional stability and available in a variety of coatings, they allow unlimited creativity in design. They have multiple applications (tables, seats, countertops, separating walls, etc.) according to the sector, from shipyards, yachts, and railways, to shops' interiors, etc.



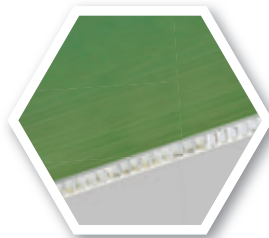
### COMPOCEL SANDWICH PANELS:



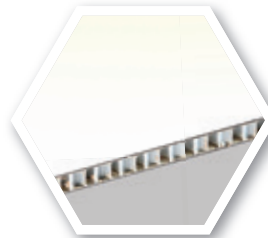
**COMPOCEL AL**  
**COMPOCEL AL FR\***  
Skins: aluminium.



**COMPOCEL H**  
Skins: high pressure laminate.



**ALUSTEP INOX**  
Skins: inox + fibreglass impregnated with epoxy resin.



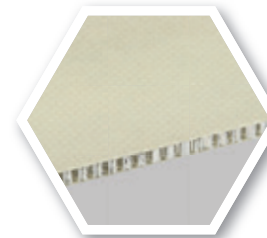
**COMPOCEL HP**  
Skins: high pressure laminate.



**COMPOCEL W**  
Skins: plywood.



**COMPOCEL WP**  
Skins: plywood.



**SERIE ALUSTEP**  
Skins: fibreglass impregnated with epoxy resin.

### ALU/POLISTEP PANELS:



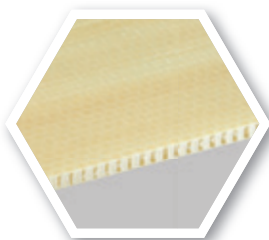
FLOOR PANELS:

HONEYCOMBS AND FOAMS:



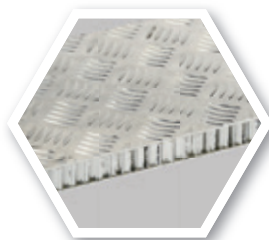
**ALUSTEP F\***

Skins: fibreglass impregnated with phenolic resin.



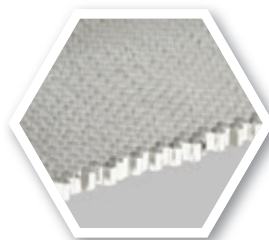
**POLISTEP**

Skins: fibreglass impregnated with epoxy resin.

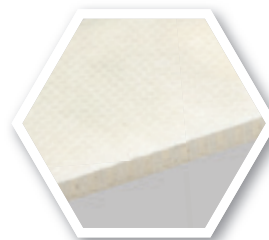


**COMPOCEL AL FLOOR  
COMPOCEL AL FR FLOOR\***

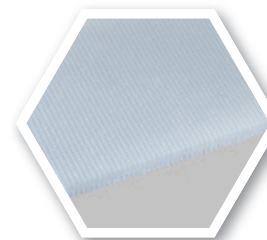
Upper face chosen among different antiskid/ anti-slip coatings.  
Lower skin: raw aluminium.



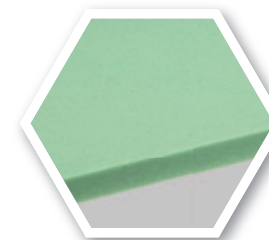
**ALUMINIUM\***



**POLYPROPYLENE**



**POLYCARBONATE**



**PVC - PET - PIR**

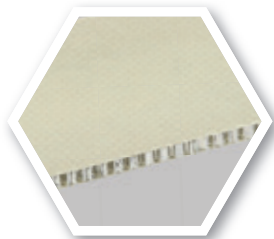
\* Certified products must be required in advance and might have a price surcharge due to certified materials.

## Stone reinforcement

CEL COMPONENTS' lightweight sandwich panels with honeycomb cores faced with various sheets of fibreglass impregnated with epoxy or phenolic resin (Alustep Series) are used to reinforce marble and semi-precious stones. By applying the panels to natural stones, the thickness of the slabs can be halved, greatly reducing the material weight and cost. This application is not only limited to marble and precious stones, but it can be also used with any natural or engineered stone or porcelain material.

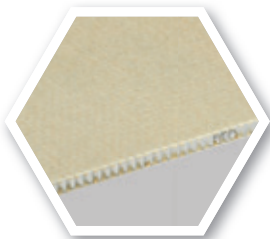


### COMPOCEL SANDWICH PANELS:



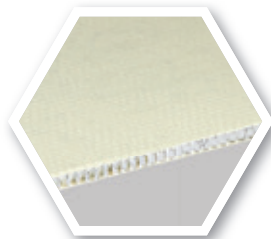
#### ALUSTEP 500

Skins: fibreglass impregnated with epoxy resin.



#### ALUSTEP 500 LIGHT

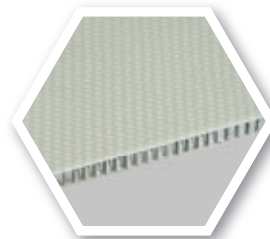
Skins: fibreglass impregnated with epoxy resin.



#### ALUSTEP 500 SL

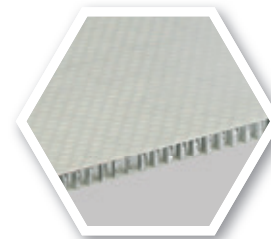
Skins: fibreglass impregnated with epoxy resin.

CLASSIFICATION  
ASTM C297  
ASTM E72-15  
ASTM E84-17A



#### ALUSTEP 300 LIGHT

Skins: fibreglass impregnated with epoxy resin.



#### ALUSTEP 300 D

Skins: 2-layers fibreglass impregnated with epoxy resin.



#### COMPOCEL AL COMPOCEL AL FR\*

Skins: aluminium.

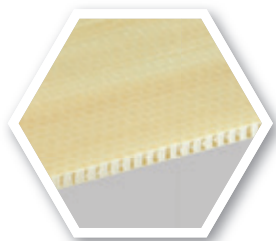


#### ALUSTEP F\*

Skins: fibreglass impregnated with phenolic resin.



HONEYCOMBS:



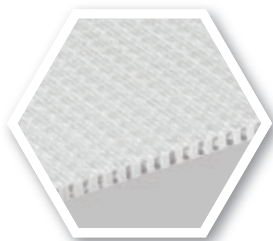
**POLISTEP**

Skins: fibreglass impregnated with epoxy resin.



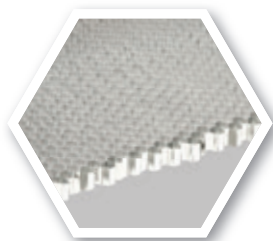
**PVC-STEP**

Skins: fibreglass impregnated with epoxy resin.

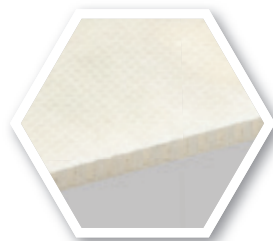


**CLEARSTEP**

Skins: fibreglass impregnated with epoxy resin.



**ALUMINIUM\***



**POLYPROPYLENE**

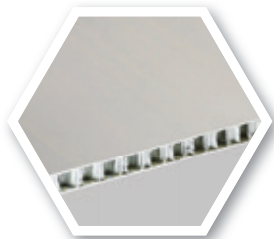
\* Certified products must be required in advance and might have a price surcharge due to certified materials.

## Building Industry

In the building industry, CEL COMPONENTS' sandwich panels are used for claddings, floors and ventilated facades in addition to decorative uses. The customer is able to determine the skin (finishing) for the panels. Therefore, our lightweight panels are produced in compliance with the specifications of the customer. CEL supplies a wide variety of panels faced with different materials: aluminium and stainless steel are just two examples. CEL COMPONENTS' aluminium honeycomb is classified A1 while COMPOCEL AL FR\* A2 and B according to the UNI EN 13501-1.



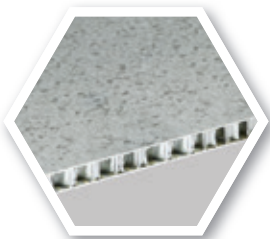
### COMPOCEL SANDWICH PANELS:



#### COMPOCEL AL FR\*

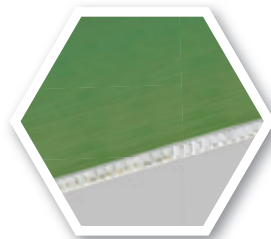
Skins: aluminium.

CLASSIFICATION  
A2 AND B ACCORDING  
UNI EN 13501 - 1



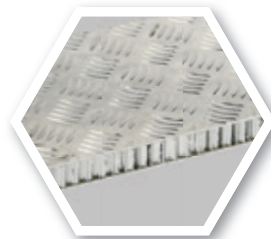
#### COMPOCEL LZ

Skins: galvanised steel on both sides.



#### ALUSTEP INOX

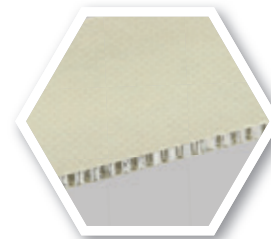
Skins: inox + fibreglass impregnated with epoxy resin.



#### COMPOCEL FLOOR

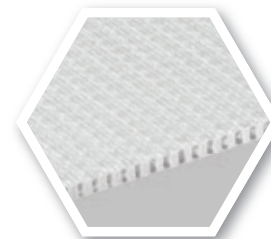
Upper face anti-slip coatings.  
Lower skin: raw aluminium.

CLASSIFICATION  
A2 AND B ACCORDING  
UNI EN 13501 - 1



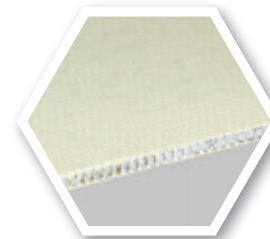
#### ALUSTEP 500

Skins: fibreglass impregnated with epoxy resin.



#### CLEARSTEP

Skins: fibreglass impregnated with epoxy resin.



#### ALUSTEP 500 SL

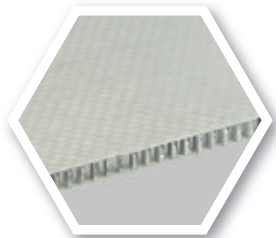
Skins: fibreglass impregnated with epoxy resin.

CLASSIFICATION  
ASTM C297  
ASTM E72-15  
ASTM E84-17A



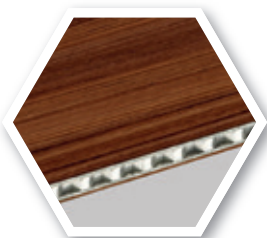


HONEYCOMBS:



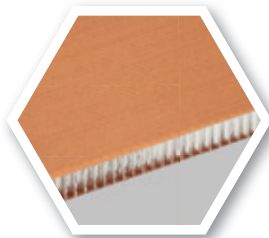
**ALUSTEP 300 D**

Skins: fibreglass impregnated with epoxy resin.



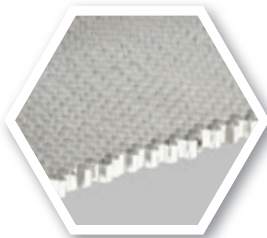
**COMPOCEL H**

Skins: high pressure laminate.



**ALUSTEP F**

Skins: fibreglass impregnated with phenolic resin.



**ALUMINIUM\***

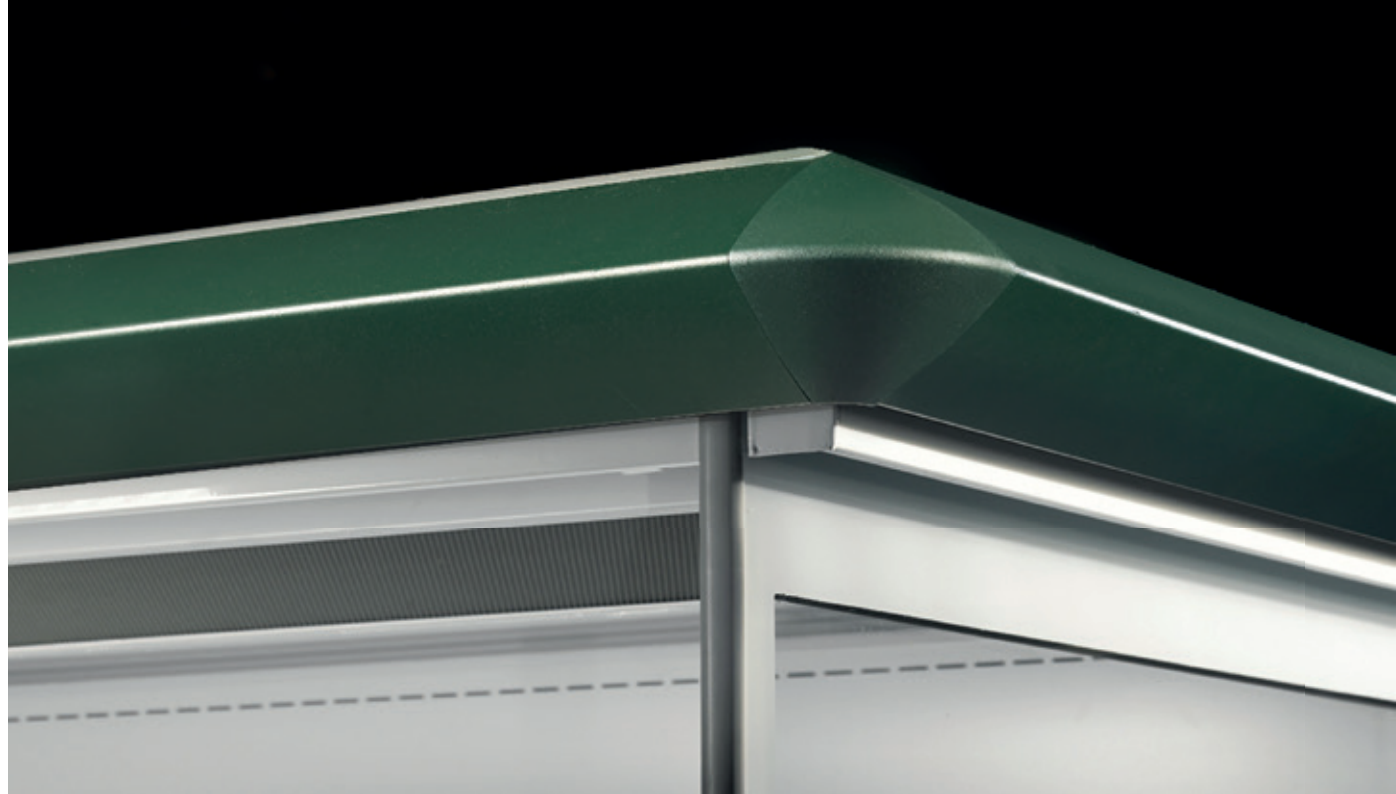
CLASSIFICATION  
A1 ACCORDING  
UNI EN 13501 - 1



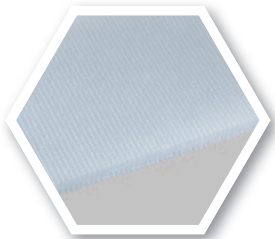
\* Certified products must be required in advance and might have a price surcharge due to certified materials.

## Refrigeration and air deflection

Polycarbonate honeycomb is a clean thermoplastic material that is highly valued in the production of refrigerating devices, wind tunnels ventilating plants, sterilized rooms, silencers and climatic chambers. The application of polycarbonate sheets on air diffusers does not only eliminate turbulence, but it also reduces the transport of impurities and humidity, as well as reducing noise and energy consumption.



HONEYCOMBS:

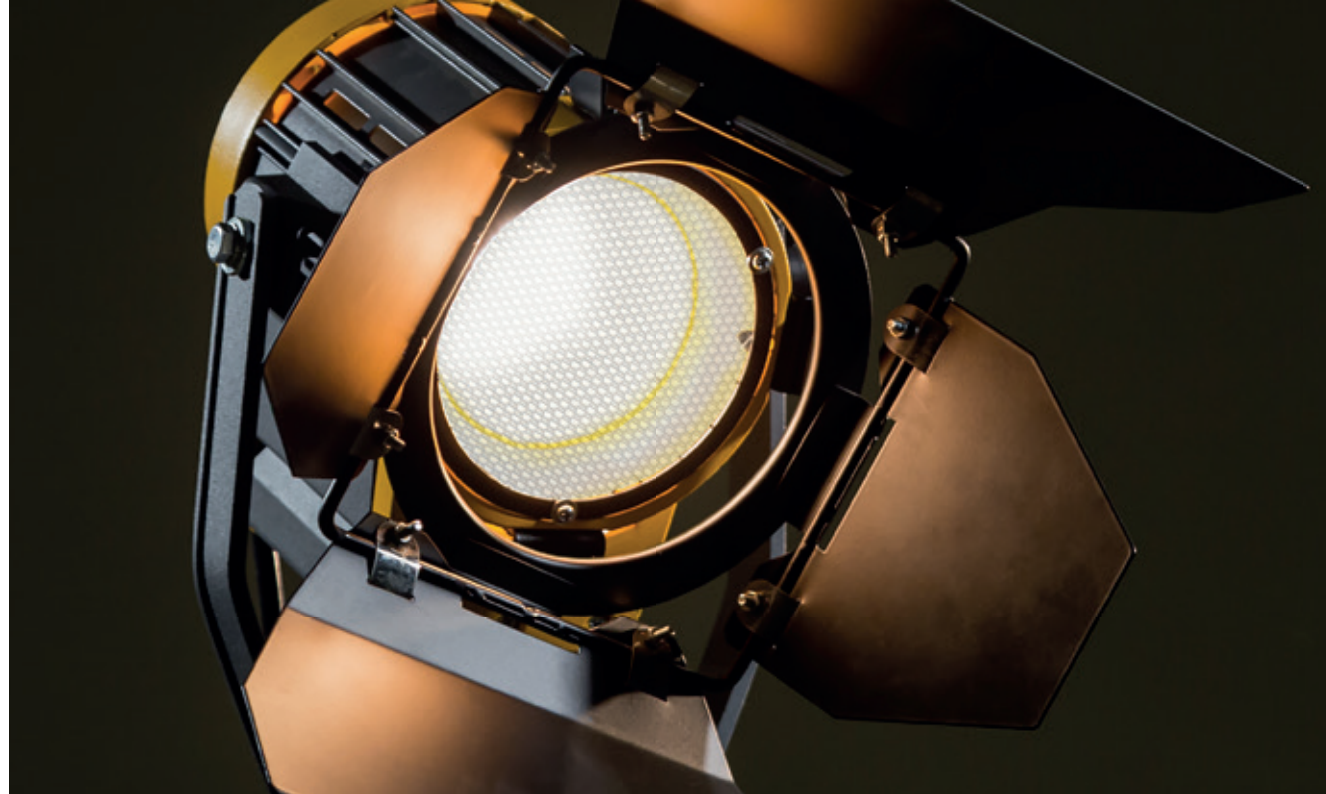


POLYCARBONATE

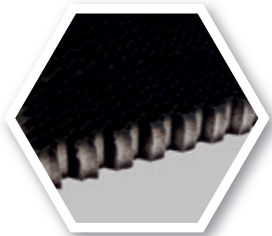


## Lighting sector

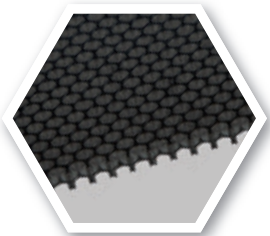
CEL COMPONENTS' aluminium and polycarbonate honeycomb cores are used as grids in front of spotlights to trap the peripheral light in all directions and limit glare. On request, the honeycombs can be painted and cut in circles of different diameters.



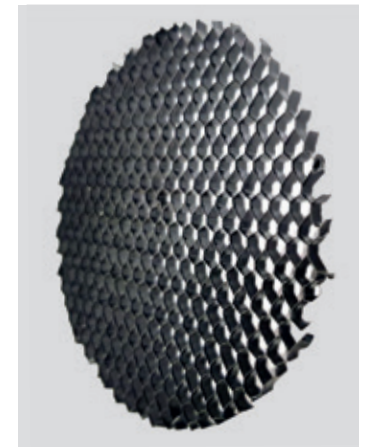
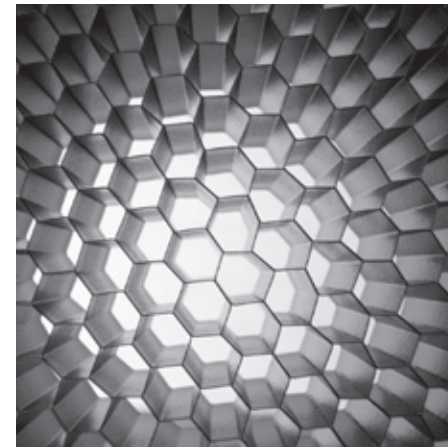
HONEYCOMBS:



ALUMINIUM



POLYCARBONATE



## Wind energy sector

In the wind energy sector, aluminium honeycomb, foams, and sandwich panels can be used in and for rotor blades, nacelles and turbine generator housings.



### HONEYCOMBS AND FOAMS:



**DRILLED ALUMINIUM HONEYCOMB**



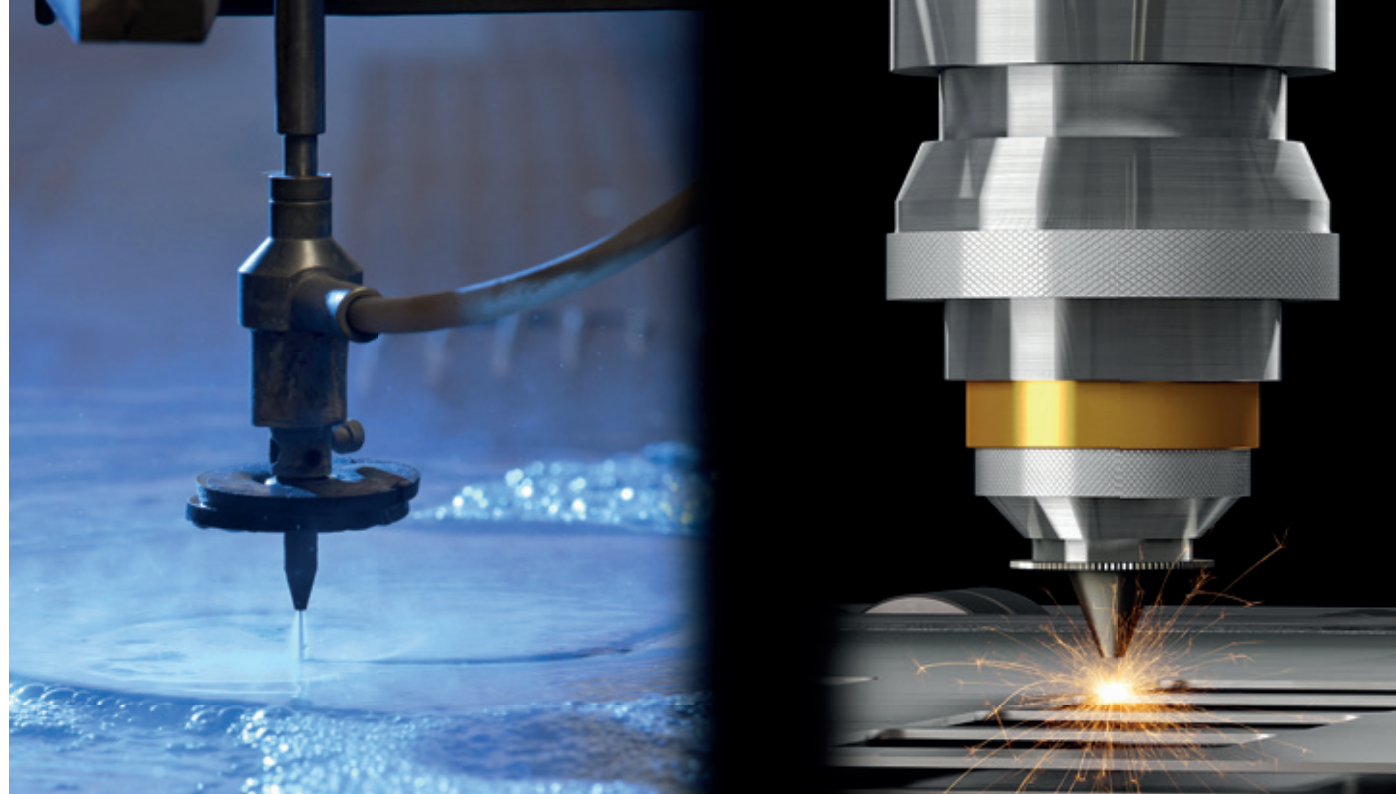
**PVC - PET - PIR**



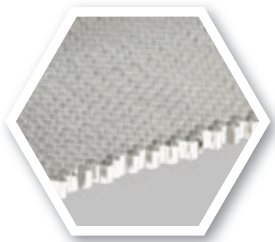
DRILLED ALUMINIUM HONEYCOMB	
ALLOY	SERIES 3000
CELL DIAMETER	Ø 3/8" +/-10%
PERFORATION	YES
FOIL THICKNESS	70 MICRON+16/-8 MICRON
DENSITY	54 KG/M³ +/-10%
TOTAL THICKNESS	60MM +/- 0.05
DIMENSIONS	L-1250 MM (-0/+50 MM) X W-2500 (-0/+50 MM) EXPANDED L-1000 MM (-0/+100) X W-3000 (-0/+100) OVEREXPANDED.

## Honeycomb for Laser and Waterjet Cutting Machines

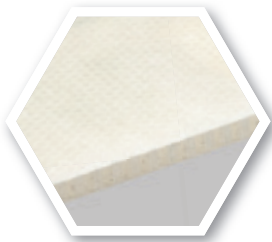
Water and Laser jet cutting machines are machines capable of slicing different materials using either a jet of water at high speed and pressure or a laser beam.



HONEYCOMBS:



**ALUMINIUM**



**POLYPROPYLENE**



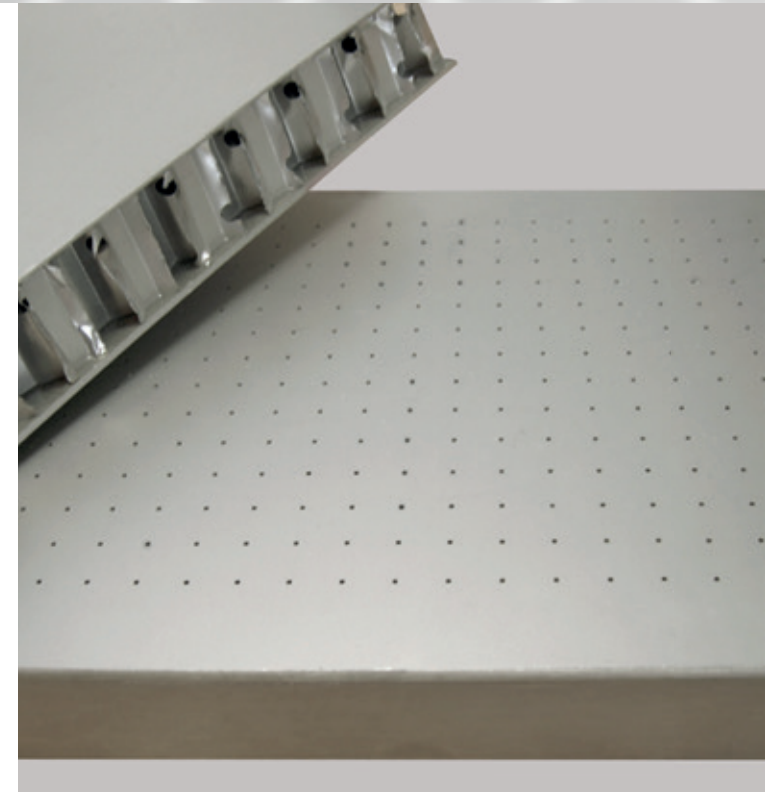
The working tables of the jet cutting machines are made of aluminium honeycomb and in the case of waterjet cutting machines, polypropylene honeycomb is also an option. Honeycomb sheets are a cost-effective consumable working platform.

## Vacuum Tables

CEL has recently acquired the newest generation 9-axis CNC machine. This state-of-the-art machine enables the production of large scale panels in a variety of different materials (wood, plywood, aluminium, plastic, laminate, etc.).

The honeycomb that constitutes the core of vacuum table is perforated according to the specifications of our customers. This procedure allows the flat part or panel to be held tightly during cutting and plotting, allowing surfaces to be

worked with uninterrupted passes. The tables are available in a wide range of sizes and configurations.



## Glues and Adhesives

Cel Components also offers two-component polyurethane and epoxy adhesives. Used in the production of sandwich panels from a variety of different core materials (aluminium or thermoplastic honeycomb, PIR, PVC, PET, etc.), their adhesive properties, water resistance and ability to withstand mechanical stress allow them to be used to bond different materials - metals (aluminium, tinplate, etc.), fibreglass, high pressure laminate, wood, plywood, etc.

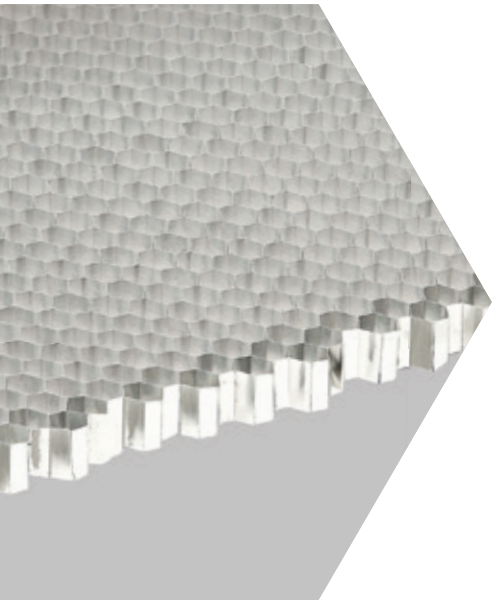
Sandwich panels glued with polyurethane

or epoxy adhesives have applications in many sectors from shipyards and building, to stone support and railways.

In particular, COMPOCEL AL FR\*, composed of structural adhesive CPB001, obtained fire certifications and classifications as required by different sectors: Class A2 and B according to the norm UNI EN 13501-1, Class HL3 for R1, R2, R10 according to the norm UNI EN 45545-2 and IMO MED Mod. B and D according to FTP CODE 2010.



\* Certified products must be required in advance and might have a price surcharge due to certified materials.



## Aluminium honeycomb\*

Aluminium honeycomb is a lightweight material with good mechanical properties: lightweight, stiffness, fire resistance, compression, shear and corrosion resistance, flatness. Aluminium honeycomb has applications in different sectors. As core material, aluminium honeycomb is the central layer of sandwich panels. Sandwich panels with aluminium honeycomb core can be used as floors, ceilings, doors, partitions, facades, working surfaces for automatic machines and for all products that require an optimal stiffness-to-weight-ratio.

Fire Classification/Certification				
Type	Norm	Sector	Certification Classification	Thickness
Non-combustible	FTP Code 2010	Shipbuilding	Mod B e D	From 3 to 50mm
Non-combustible	UNI EN 13501-1	Building	A1	From 3 to 50mm



\* Certified products must be required in advance and might have a price surcharge due to certified materials.

### Technical features

Honeycomb core's properties		50 Microns				
Aluminium Alloy series 3000		3003/3005/3103/3104				
Ø honeycomb in mm ca.	3,2	6	9	12	19	
Ø honeycomb in inches	1/8"	1/4"	3/8"	1/2"	3/4"	
Density kg/m3	116	56 - 59	39 - 40	29 - 30	20 - 21	
Compressive stabilised strength MPa	6,5	3,0 - 3,5	1,4 - 1,95	0,8 - 0,95	0,4 - 0,6	

Honeycomb core's properties		70 Microns				
Aluminium Alloy series 3000		3003/3005/3103/3104				
Ø honeycomb in mm ca.	3,2	6	9	12	19	
Ø honeycomb in inches	1/8"	1/4"	3/8"	1/2"	3/4"	
Density kg/m3	163	80 - 83	54	40 - 42	27 - 29	
Compressive stabilised strength MPa	10,2	4,3 - 4,6	2,5 - 2,6	1,41 - 1,5	0,85 - 0,9	



## Polypropylene honeycomb

Thanks to its chemical-resistance and its reliability in aggressive environments, polypropylene honeycomb can be used as support for filters to reduce corrosive gas emissions. Cel supplies different types of polypropylene honeycomb:

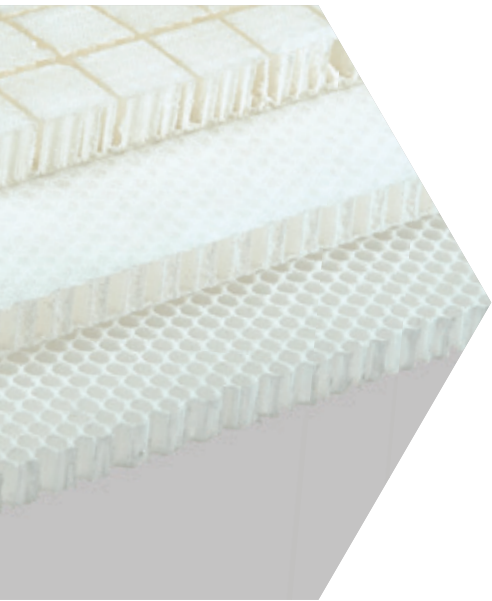
- Polypropylene honeycomb without TNT (PP 8.80)
- Polypropylene honeycomb with TNT (a thin thermo-welded sheet on both sides; PP 8-80 T30, PP8-120 T30)
- Polypropylene honeycomb with TNT and a plastic film (thermos-welded on both sides; PP 8-80 T30 F75)

Polypropylene honeycomb, one of the core materials in sandwich panels, is bonded to different materials (aluminium sheets, high pressure laminate skins, marine plywood, fibreglass, etc.), and can be thermo-welded or glued to TNT or technical fabrics, which makes the production of sandwich and lightweight panels easier.

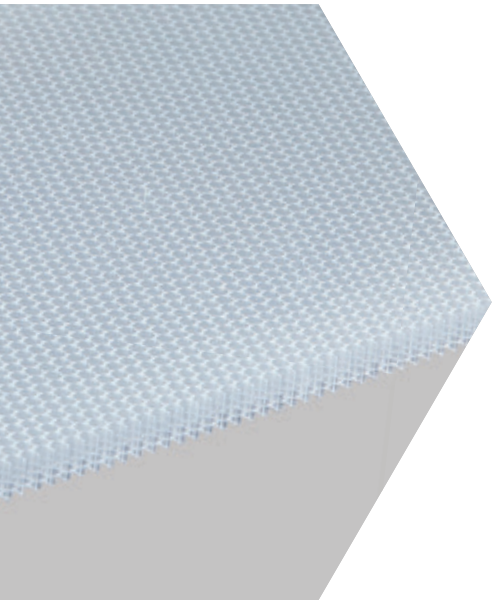
Polypropylene honeycomb is also used as flat surface for cutting tools (waterjet cutting machines).

### Technical features

Honeycomb core's properties				
Type	8.80	8.80T30	T30F75	8.120T30
Cell size mm	8			
Colour	white			
Density kg/m3	80			120
Compressive strength MPa	1,5	1,60	1,60	3,4
Compressive modulus MPa	70			90
Shear strength MPa	-	0,50	0,50	1
Shear modulus MPa	-	12	13	18
Effective temperature range °C	from -30 a +80			
Maximum width mm	1400	1500	1500	1500
Minimum width mm	1002			600
Maximum length mm	29502	-	-	30002
Width tolerance mm	+/- 4			
Tolerance length mm	+/- 4			
CORE'S thickness mm	7 - 100	7 - 65	6 - 65	5 - 65







## Polycarbonate honeycomb

Polycarbonate honeycomb is a thermoplastic material available in different sizes, thicknesses, colours and cells diameter. It's used mainly for laminar-flow ventilation, commercial refrigeration, sterilized rooms, wind tunnels, and climatic chambers.

Honeycomb deflectors increase air flow efficiency and efficacy. Moreover, they eliminate turbulence, reduce impurity, humidity, and noise and energy consumption.

In lighting industry, black polycarbonate honeycomb is used as grids in front of led lamps to trap the peripheral light.

### Technical features

Honeycomb core's properties	standard		on request		
	3, 5-90	6, 0-70	2, 5-110	4, 0-80	7, 0-70
Type	3, 5	6, 0	2, 5	4, 0	7, 0
Cell size mm	3, 5	6, 0	2, 5	4, 0	7, 0
Colour	grey • white • transparent • black				
Density kg/m <sup>3</sup>	90	70	110	80	70
Compressive strength MPa	2, 8	1, 9	3, 6	2, 2	1, 8
Compressive modulus MPa	115	95	155	106	95
Shear strength MPa	1, 3	1, 0	1, 5	1, 1	1, 0
Shear modulus MPa	22	19	25	21	19
Effective temperature range °C	from -40 a +110				
Thickness mm	from 3 a 300				
Maximum length mm	3000				
Maximum Width mm	1350				



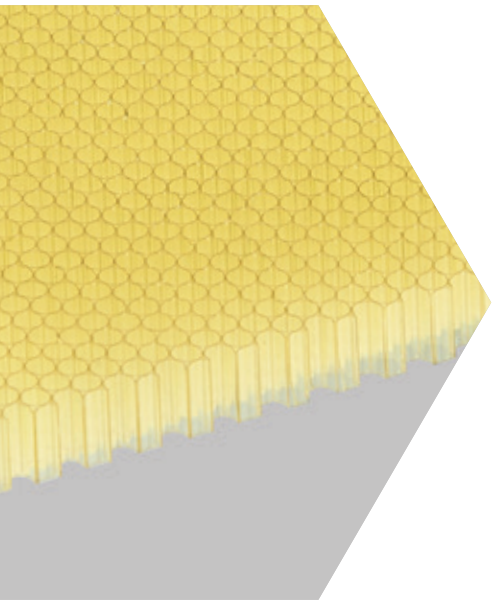
AERUALICS AND REFRIGERATION



INTERIORS



STONES, MOSAICS, MARBLE SUPPORT



## Polyetherimide honeycomb

Polyetherimide is a thermoplastic material. This polymer differs from other thermoplastics because of its high temperature resistance and its capacity to reflect radar. It is used for the production of stealth panels for military use, for hi-tech panels and as the core material for snow boards.

### Technical features

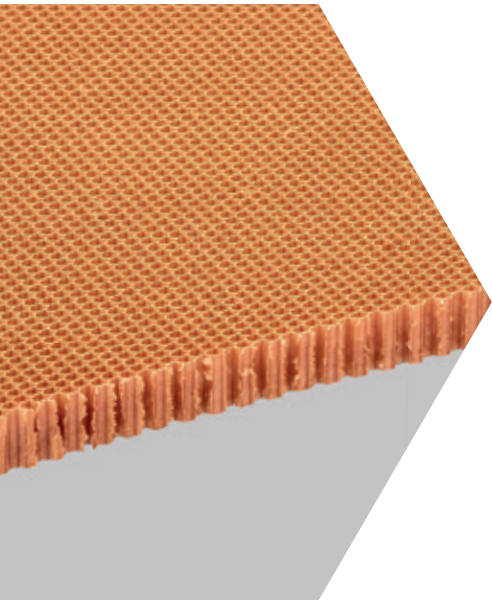
Honeycomb core's properties					
Type	4,0-48C	4,0-75C	4,0-100C	4,0-120C	4,0-144C
Cell size mm	4,2				
Colour	amber				
Density kg/m <sup>3</sup>	48	75	100	120	144
Compressive strength MPa	0,83	3,00	4,16	6,34	10,67
Shear strenght MPa	0,63	1,35	1,60	2,10	3,30
Shear modulus MPa	12,2	25,2	26,4	32	40
Effective temperature range °C	from -40 a +170				
Flammability	low / self-extinguishing				
Thickness mm	from 5 a 300				
Maximum length mm	3000				
Maximum width mm	1350				



SHIPBUILDING



AERONAUTICS



## Commercial and Aeronautical grade aramid paper

Aramid paper impregnated with a heat resistant phenolic resin is an extremely lightweight, strong, non-metallic product. As a core material, aramid paper offers a unique combination of properties that allows for superior electrical insulation. Used in boat hulls, auto racing bodies and military shelters, aramid paper honeycomb cores also have many applications in the aeronautical, railway and shipyard industries.

### Technical features

Nomex Honeycomb-Commercial Grade					
Nomenclature		Compression Strength	L Shear	W Shear	
	Ø Cell size mm	Density kg/m <sup>3</sup>	N/mm <sup>2</sup>	N/mm <sup>2</sup>	N/mm <sup>2</sup>
Hexagonal	3,2	48	1,90	1,16	0,62
Hexagonal	3,2	64	3,10	1,48	0,82
Hexagonal	3,2	80	4,70	1,95	1,05
Hexagonal	3,2	96	6,60	2,45	1,42
Hexagonal	3,2	128	11,30	2,95	1,78
Hexagonal	3,2	144	13,20	3,05	1,90
Hexagonal	4,0	29	0,60	0,45	0,26
Hexagonal	4,0	80	5,10	1,90	0,98
Hexagonal	4,8	32	0,90	0,58	0,36
Hexagonal	4,8	48	2,60	0,98	0,56
Hexagonal	4,8	64	3,40	1,70	0,92
Hexagonal	4,8	80	6,00	1,95	1,10

Nomex Honeycomb-Commercial Grade					
Nomenclature		Compression Strength	L Shear	W Shear	
	Ø Cell size mm	Density kg/m <sup>3</sup>	N/mm <sup>2</sup>	N/mm <sup>2</sup>	N/mm <sup>2</sup>
Hexagonal	4,8	96	7,30	2,26	1,32
Hexagonal	6,4	24	0,54	0,34	0,18
Hexagonal	6,4	32	0,80	0,54	0,30
Hexagonal	6,4	48	2,05	1,00	0,56
Hexagonal	6,4	64	3,40	1,54	0,79
Hexagonal	9,6	24	0,54	0,34	0,18
Hexagonal	9,6	32	0,68	0,56	0,29
Hexagonal	9,6	48	1,80	1,15	0,66
Over expanded	4,8	29	0,60	0,31	0,32
Over expanded	4,8	48	2,30	0,60	0,72
Over expanded	4,8	64	3,80	0,72	0,90
Over expanded	4,8	72	4,00	0,75	0,92
Over expanded	4,8	80	5,30	0,88	1,17
Over expanded	4,8	96	6,70	0,92	1,28
Over expanded	6,4	48	2,30	0,60	0,72
Over expanded	6,4	64	3,20	0,72	0,90



## Foams

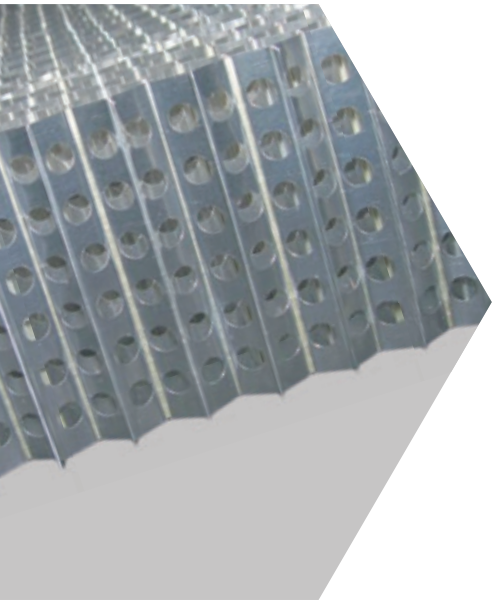
PVC PET and PIR foams offer optimal stiffness-to-weight-ratio, impact resistance, water resistance, thermal insulation, low resin absorption and high fatigue resistance. PVC foam is also self-extinguishing therefore it has good fire ratings. It is compatible with polyester, vinylester and epoxy resin. CEL COMPONENTS' foams are easy to work, they can be rolled, cut, etc.

CEL's foams have applications in many sectors, from marine applications (decks, bulkheads, interiors, hulls, etc.), to public vehicles (floors, interiors, partition walls, roof panels, front ends), wind energy (rotor blades, turbine generator housings), and sports (skis, snowboard, kayaks etc.); the applications are endless.

### Technical features

Honeycomb core's properties				PVC 40	PVC 48	PVC 60	PVC 80	PVC 100	PVC 130	PVC 200
Density kg/m <sup>3</sup>	ASTM D1622	kg/m <sup>3</sup>	nominal	40	48	60	80	100	130	200
Compressive strength	ASTM D1621-10	MPa	average min-ave min-min	0,51 0,30 0,20	0,69 0,48 0,37	0,96 0,75 0,61	1,43 1,22 1,03	1,93 1,72 1,47	2,73 2,52 2,25	4,84 4,64 4,00
Compressive modulus	ASTM D1621-10	MPa	average min-ave min-min	24 10 5	33 18 13	46 31 25	68 53 44	90 76 64	125 111 99	212 198 172
Tensile strength	ASTM D1623	MPa	average min-ave min-min	0,74 0,47 -	0,95 0,66 -	2,11 1,33 1,19	2,60 1,82 1,63	3,08 2,31 2,06	3,81 3,04 2,79	6,61 5,61 5,33
Tensile modulus	ASTM D1623	MPa	average min-ave min-min	74 44 36	87 57 49	106 75 66	137 107 94	169 138 123	216 185 170	415 343 317
Shear strength	ASTM C273	MPa	average min-ave min-min	0,41 0,34 0,25	0,55 0,49 0,40	0,77 0,70 0,60	1,13 1,06 0,92	1,49 1,43 1,25	2,03 1,97 1,79	3,59 3,23 2,81
Shear modulus	ASTM C273	MPa	average min-ave min-min	13 9 6	16 12 10	21 17 14	29 25 22	37 33 29	49 45 41	78 74 65
Shear elongation at break	ASTM C273	%	average	5	9	13	20	25	32	41
Dimensions: l-w-t		mm	length width thickness	1330 2850 84	1270 2730 80	1150 2450 78	1020 2180 72	950 2050 68	850 1900 58	750 1600 48





## Perforated aluminium honeycomb

Perforated aluminium honeycomb is normally used as core for vacuum tables and as core for moulds in the wind blade industry. The honeycomb is normally perforated longitudinally to permit the correct air flow.

Perforations are implemented in compliance with our customers' needs although 6 hole-perforation is standard.

### Technical properties

Honeycomb core's properties	
Type	Aluminium Alloy 3003/3005/3103/3104
Grade	Aluminium Commercial
Cell size	on request +/- 10%
Perforation	Yes
Foil thickness	70 Micron +16/-8 Microns
Density	It depends on the cell +/- 10%
Thickness of slices	On request
Dimensions	L-1250 mm (-0/+50 mm) x W-2500 (-0/+50 mm) expanded L-8500 mm (-0/+100 mm) x W-3000 (-0/+100 mm) overexpanded. The regularity of the cell is not guaranteed.
Number of holes and their diameter	On request

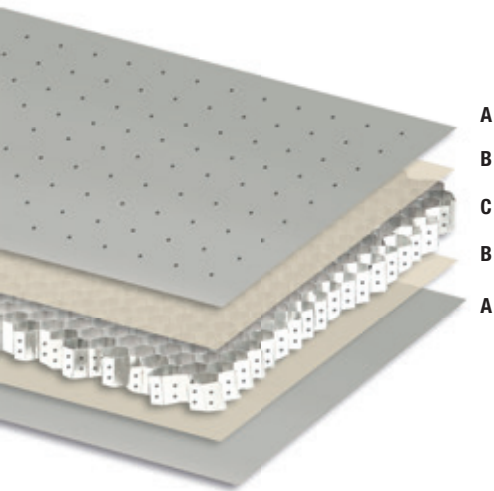
Honeycomb core's properties	70 Microns				
Aluminium alloy	3003/3005/3103/3104				
Ø honeycomb in mm	3,2	6	9	12	19
Ø honeycomb in inches	1/8"	1/4"	3/8"	1/2"	3/4"
Density kg/m3	163	80 - 83	54	40 - 42	27 - 29
Compressive stabilised strength MPa	10,2	4,3 - 4,6	2,5 - 2,6	1,41 - 1,5	0,85 - 0,9



WIND ENERGY

## Vacuum Tables

- Aluminium honeycomb core
- Outstanding planarity
- Lightness
- Resistance to cleaning solvents
- Aluminium surfaces and profiles
- Special dimensions on request



**A** = RAW ALUMINIUM SKINS. Thickness: from 1,5 to 3 mm.

**B** = STRUCTURAL ADHESIVE

**C** = PERFORATED ALUMINIUM HONEYCOMB

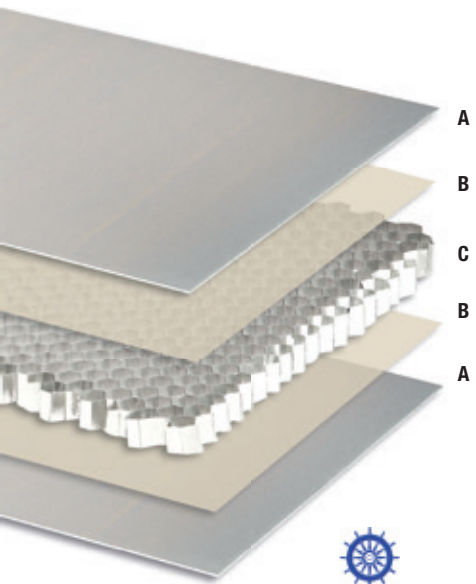
Ø 19 mm, 2 holes Ø 7mm

### Technical properties

CEL COMPONENTS' Vacuum Tables are made of a core in perforated aluminium honeycomb bonded to two aluminium layers, one of which is perforated according to the customers' specifications.

Vacuum tables are used in different sectors: serigraphy, electronic, modelling and engraving industry. High planarity is one of the main characteristics of CEL's vacuum tables.

Customers can also choose the profiles and coating characteristics.



## CompoCEL AL and CompoCEL AL FR\*

COMPOCEL® AL is a sandwich panel with a core in aluminium honeycomb bonded with two skins of aluminium. COMPOCEL® AL FR\* offers superior mechanical properties and excellent fire ratings. It has passed the most stringent tests of European Regulation in shipbuilding, building and railway sectors.

**A** = SKINS IN ALUMINIUM - Thickness mm: 0,5 - 0,8 - 1 (standard)

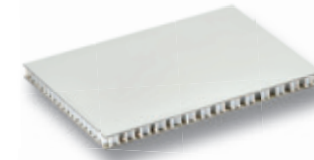
**B** = STRUCTURAL ADHESIVE / **C** = CORE IN ALUMINIUM HONEYCOMB with hexagonal cells

Fire Classification/Certification				
Type	Norm	Sector	Certification/Classification	Thickness
Low flame spread	IMO MED FTP Code 2010	Shipyard	Mod B and D	From 5 to 50mm
Smoke, droplets, calorific value	UNI EN 13501-1	Building (Interiors)	Class A2 / Class B Class BFL	From 5 to 50mm
Smoke, droplets, calorific value	UNI EN 13501-1	Building (Ventilated facades)	Class A2	Thickness 20 ø 9
Floors, ceilings, interiors, R1, R2, R10	UNI EN 45545-2	Railway	Class HL3	From 5 to 50mm
Low flame spread, Smoke	ASTM E-84	Building	Classe A o I	12,7mm



\* Certified products must be required in advance and might have a price surcharge due to certified materials.

### Other CompoCEL Panels with aluminium skins



#### CompoCEL ALP

With a polypropylene honeycomb core.



AUTOMOTIVE



#### CompoCEL ALF

With a foam core.



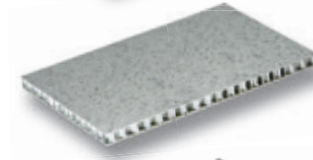
AUTOMOTIVE



INTERIORS



PANELS

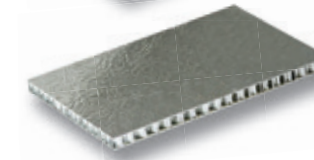


#### CompoCEL LZ

With an aluminium honeycomb core.



BUILDING



#### CompoCEL Inox

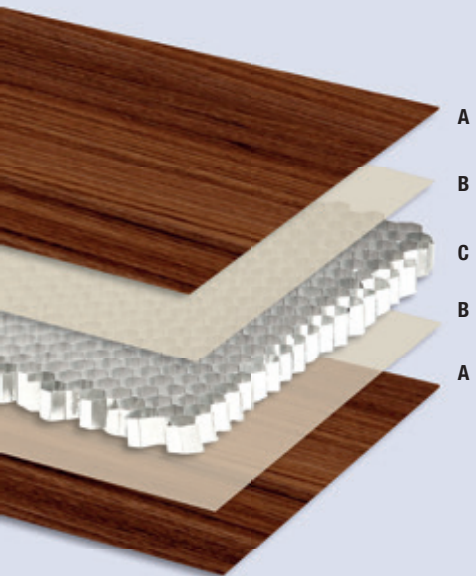
With an aluminium honeycomb core.



BUILDING



INTERIORS



## CompoCEL H

COMPOCEL® H is a sandwich panel with a core in aluminium honeycomb bonded with high pressure laminate face material. The external layer in laminate can have various finishes and colours.

Lightweight panel COMPOCEL® H have different applications (partitions, interiors, furniture, ceilings and floors).

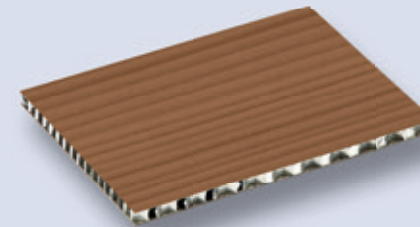
**A** = SKINS IN HIGH PRESSURE LAMINATE - Thickness: from 0,7 to 4 mm

**B** = STRUCTURAL ADHESIVE

**C** = CORE IN ALUMINIUM HONEYCOMB with hexagonal cells



### Other CompoCEL Panels with high pressure laminate skins



#### CompoCEL ALH

Aluminium honeycomb faced on one or both sides with decorative laminate upper and lower skin in raw aluminium.



SHIPBUILDING



INTERIORS



RAILWAY

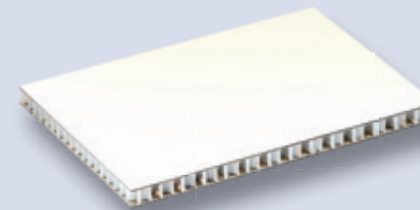


FLOOR



PANELS

ASSESSMENT OF RESISTANCE TO IMPACT ACCORDING TO THE NORM ISO 4211-4: 1988



#### CompoCEL HP

With a polypropylene honeycomb core.



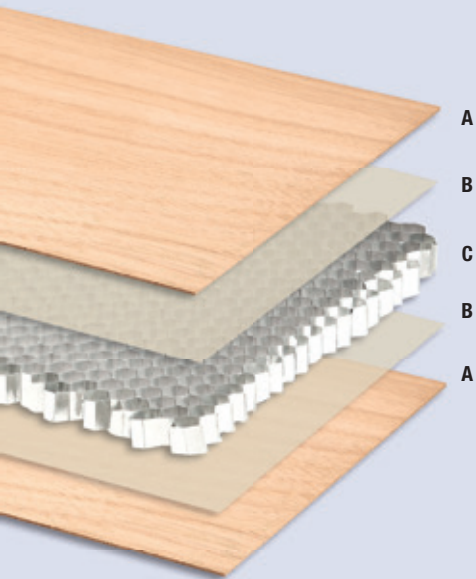
SHIPBUILDING



INTERIORS



PANELS



## Compoce W

COMPOCEL® W is a sandwich panel with an aluminium honeycomb core and plywood skins. All our products are produced according to our customers' needs, and therefore the customer chooses the main characteristics of the panel, such as the type of coating, sizes, and finishes. COMPOCEL® W is normally used for interior design and furniture in various sectors.

- A** = SKINS IN MARINE PLYWOOD quality Okoumé  
Thickness: from 1,5 to 8 mm
- B** = STRUCTURAL ADHESIVE
- C** = CORE IN ALUMINIUM HONEYCOMB with hexagonal cells



## Other Compoce Panels with plywood



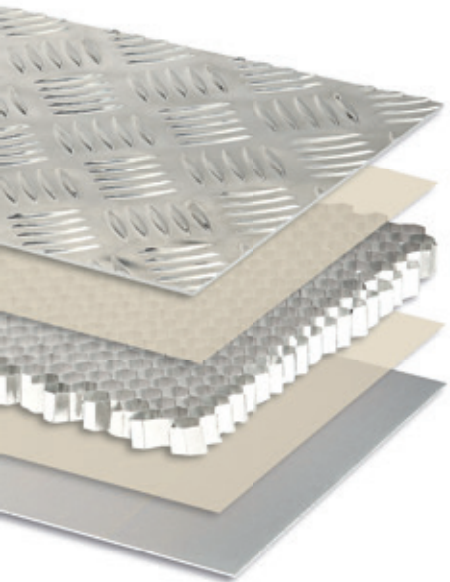
### Compoce WP

With a polypropylene honeycomb core.



### Compoce WF

With a foam core.



## Compoce AL FLOOR Compoce AL FR FLOOR\*

COMPOCEL® FLOOR ALU-RIS, ALU-MAN is an aluminium honeycomb core bonded with two aluminium skins. The upper face (thickness from 2mm) can be chosen among different antiskid / anti-slip coatings (almond pattern, rice corn pattern, etc.). As this panels is often used as flooring, where superior mechanical properties are required, the preferred thickness of the aluminium foil is 70 microns (high density), bringing the total thickness of the panel up to 20mm.

- A** = SKINS IN ALUMINIUM WITH ANTI-SLIP COATING
- B** = STRUCTURAL ADHESIVE
- C** = CORE IN ALUMINIUM HONEYCOMB with hexagonal cells
- D** = RAW ALUMINIUM SKINS

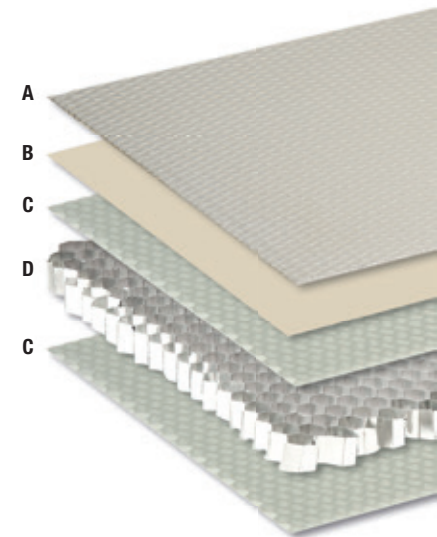
FOR THE CERTIFIED VERSION PLEASE SEE THE DATASHEET AT PAGE 28



## Alustep FLOOR

ALUSTEP® FLOOR is a lightweight sandwich panel with a core in aluminium honeycomb bonded to two layers of fibreglass reinforced with epoxy resin. One side has an additional skin in satin finished stainless steel. This panel is normally used as decorative finishing for interiors. It is also used in architecture and design as it combines decorative and mechanical properties. These panels can be used for floors, ramps, lifts, engine and technical rooms and in general where anti-slip properties are required.

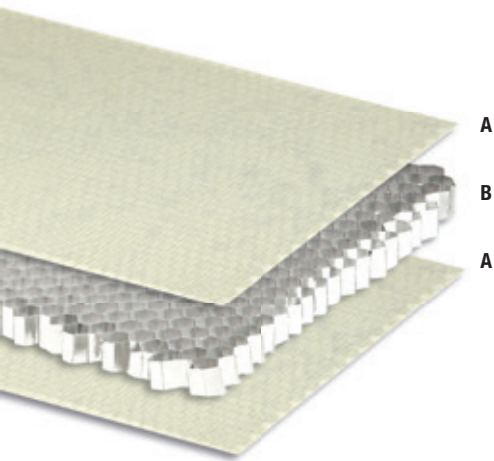
- A** = SKIN IN INOX - DECORATIVE NATURAL STAINLESS STEEL
- B** = STRUCTURAL ADHESIVE
- C** = SKINS IN GLASSFIBER FABRIC impregnated with epoxy resin
- D** = CORE IN ALUMINIUM HONEYCOMB with hexagonal cells



## Alustep 500

ALUSTEP® 500 is a sandwich panel with a core in aluminum honeycomb faced with fibreglass impregnated with epoxy resin. The application of 'ALUSTEP SERIES' panels permits huge savings as far as weight and thickness of slabs of natural stones, such as marbles and granite and mosaics are concerned. With the reduction of material and weight, material, logistics and installation costs can be significantly reduced.

**A** = SKINS IN FIBREGLASS impregnated with epoxy resin 500g/m<sup>2</sup>  
**B** = CORE IN ALUMINIUM HONEYCOMB with hexagonal cells



### Alustep panels with glassfibre skins:

## Alustep 500 Light

With an aluminium honeycomb core.



## Alustep 500 SL\*

With an aluminium honeycomb core.

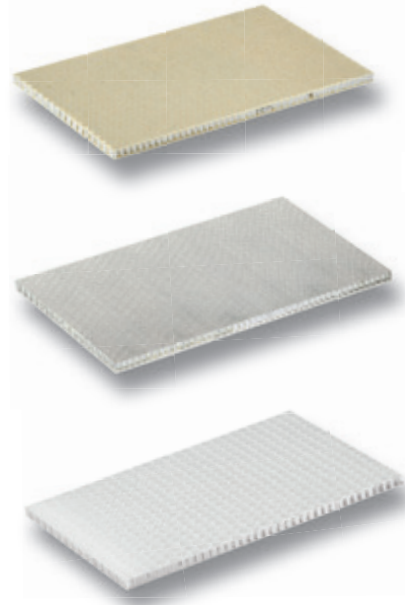


## Clearstep

With a polypropylene honeycomb core.



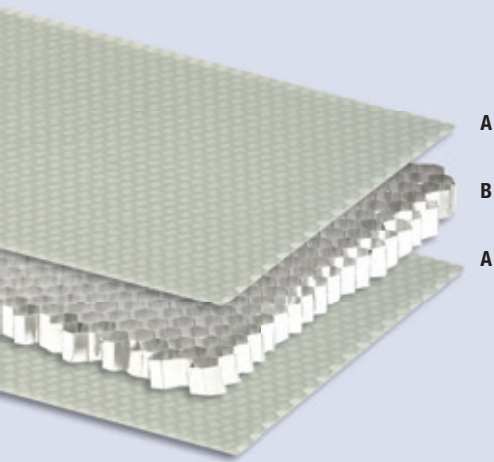
\* CLASSIFICATION: ASTM C297 / ASTM E72-15 / ASTM E84-17A



## Alustep 300 Light

ALUSTEP® 300 LIGHT is a lightweight composite panel with an aluminum honeycomb core faced with fibreglass impregnated with 290 gram epoxy resin. This panel offers unique characteristics as it combines lightweight with superior mechanical properties. This is the lightest panel of Alustep series.

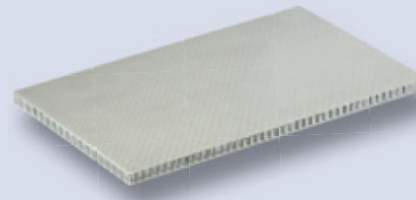
**A** = SKINS IN FIBREGLASS impregnated with epoxy resin 290g/m<sup>2</sup>  
**B** = CORE IN ALUMINIUM HONEYCOMB with hexagonal cells



### Also available as:

## Alustep 300 D

Skins: 2-layers fibreglass impregnated with epoxy resin + aluminium honeycomb.

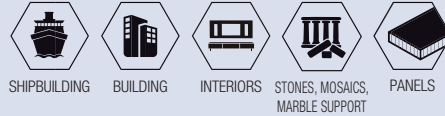
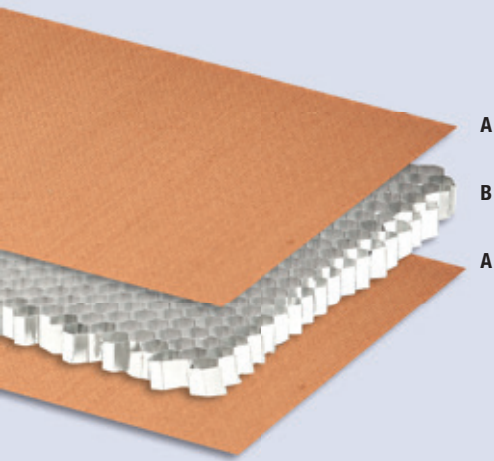


## Alustep F\*

ALUSTEP® F is a lightweight sandwich panel with a core in aluminum honeycomb and two external layers in fiberglass reinforced with phenolic resin. Thanks to the low flammability of phenolic resin, this panel can be used in shipyards, trains and transport in general. Alustep F has obtained the IMO MED certification Mod. B and D for shipbuilding sector.

**A** = SKINS IN FIBREGLASS impregnated with phenolic resin 290g/m<sup>2</sup>  
**B** = CORE IN ALUMINIUM HONEYCOMB with hexagonal cells

Fire Classification/Certification				
Type	Standard	Sector	Certification Classification	Thickness
Low flame spread	IMO MED FTP Code 2010	Shipyards	Mod B e D	From 5 to 50mm
Floors, R10	UNI EN 45545-2	Railway	Class HL3	From 5 to 50mm
Ceilings, interiors, R1, R2	UNI EN 45545-2	Railway	Class HL2	From 5 to 50mm



## Other panels with phenolic resin skins:



## Alustep FN\*

With an aramid paper honeycomb core.

Fire Classification/Certification				
Type	Standard	Sector	Certification Classification	Thickness
Low flame spread	IMO MED FTP Code 2010	Shipyards	Mod B e D	From 4 to 25mm
Floors, R10	UNI EN 45545-2	Railway	Class HL3	From 4 to 25mm
Ceilings, interiors, R1, R2	UNI EN 45545-2	Railway	Class HL2	From 10 to 25mm

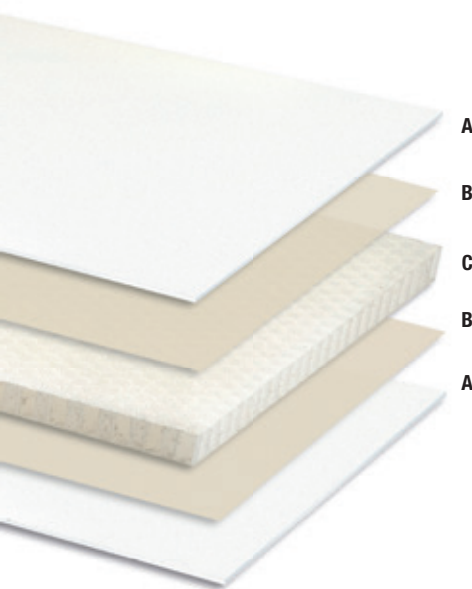


\* Certified products must be required in advance and might have a price surcharge due to certified materials.

## Compocecel VP

COMPOCECEL® VP is a sandwich panel with a core in polypropylene honeycomb and two external skins in polyester GRP with white gelcoat. This panel can be used either for insulation of vehicles or for exterior furniture and coatings.

**A** = SKIN OF POLYESTER GRP with white gel coat and protective film on gelcoat side -Thickness: from 1,1 mm to 3 mm  
**B** = STRUCTURAL ADHESIVE  
**C** = CORE IN POLYPROPYLENE HONEYCOMB

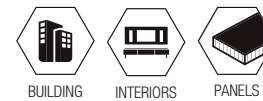
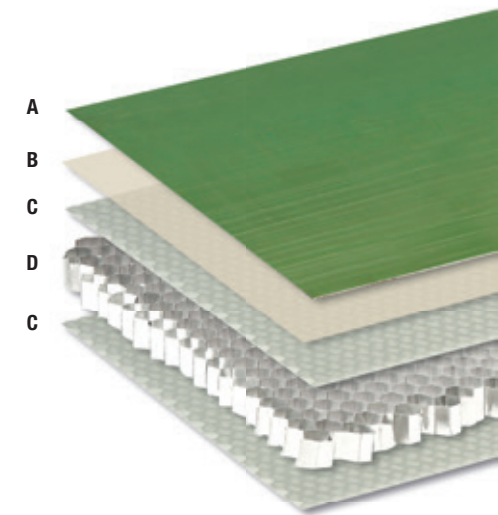


## Alustep o Polistep Inox

ALUSTEP® INOX is a lightweight composite panel with an aluminum honeycomb core faced with fiberglass impregnated with epoxy resin and coated with a skin in satin finished stainless steel. This panel is normally used as decorative part for interiors. It is also used in architecture and design as it combines decorative and mechanical properties.

Polystep Inox is the same panel with a core in polypropylene honeycomb.

**A** = INOX - STAINLESS STEEL - SATIN FINISH INC  
**B** = STRUCTURAL ADHESIVE  
**C** = FIBREGLASS impregnated with epoxy resin  
**D** = CORE IN ALUMINIUM HONEYCOMB with hexagonal cells





## SANDWICH PANELS AND HONEYCOMB

**CEL Components S.r.l.**

Via Ca' dell'Orbo Sud, 4 · 40055 Castenaso (Bo) Italy

Tel. +39 051 782505 · Fax +39 051 782477

info@cel.eu

**www.cel.eu**

LIABILITY DISCLAIMER: The above data are to the best of our knowledge correct and are intended to give information about our products and their potential applications. No warranty is given or implied in respect of certain properties of the products or their suitability for a particular application. We reserve the right for technical changes without further notice. We guarantee impeccable product quality under our terms of sale.



Regione Emilia-Romagna



UNI EN ISO  
9001:2015  
Reg No: 9910-A