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The MVL Hotel Yeosu
with Alucolam ACP

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Introduction to Alucolam

Uniwell International Enterprises Corp. was founded in 1994 as a niche market specialty manufacturer, product innovator and pioneer. Included among Uniwell's notable successes is the launch and development of the brand Alucolam Aluminum Composite Material and Alucomb Honeycomb panels. With annual volumes over \$100,000,000 USD, hundreds of employees and affiliates globally, state-of-the-art ISO 9002 manufacturing, and a national network of shipping logistics experts. Customers can rest assured that Alucolam is a quality brand supported by a strong management team and that is covered by a solid warranty.

Alucolam brand is built on trust. We take pride in fulfilling orders of exceptionally high quality product, consistent specification, concise delivery, and offer full order progress reporting and tracking support services. Honoring our commitments is our number one priority.

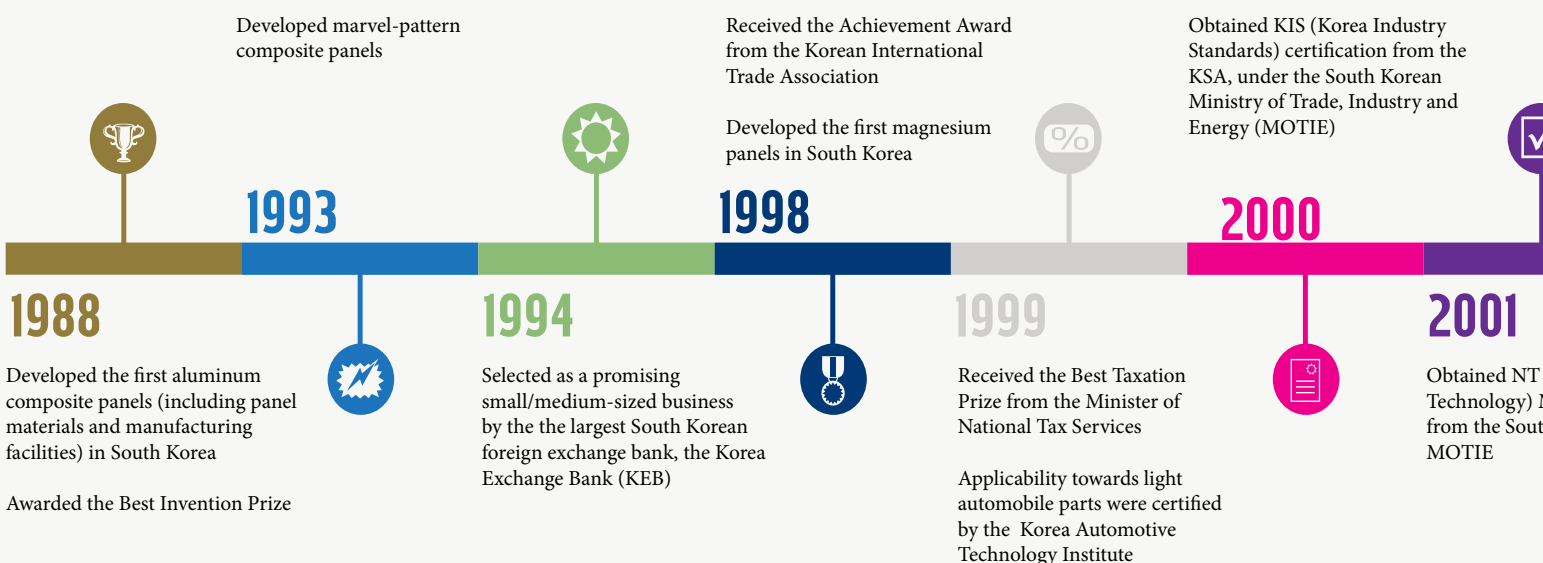
As a market leader, Alucolam's diverse applications extend from architectural construction markets to marine, aerospace, light rail, defense, energy, and signage.

Alucolam's standard color selection pallet will satisfy most project requirements. For those designers looking for unique finishes with the same durability of standard ACM (PVDF baked durnar finish) but with an artistic flare, Alucolam co-created a strategic alliance with Euramax offering the Euramax full range of designer specialty European coated coil finish options. Upgrading to Euramax specialty finishes add less than 1% premium to the overall cladding costs but the impact will be priceless.



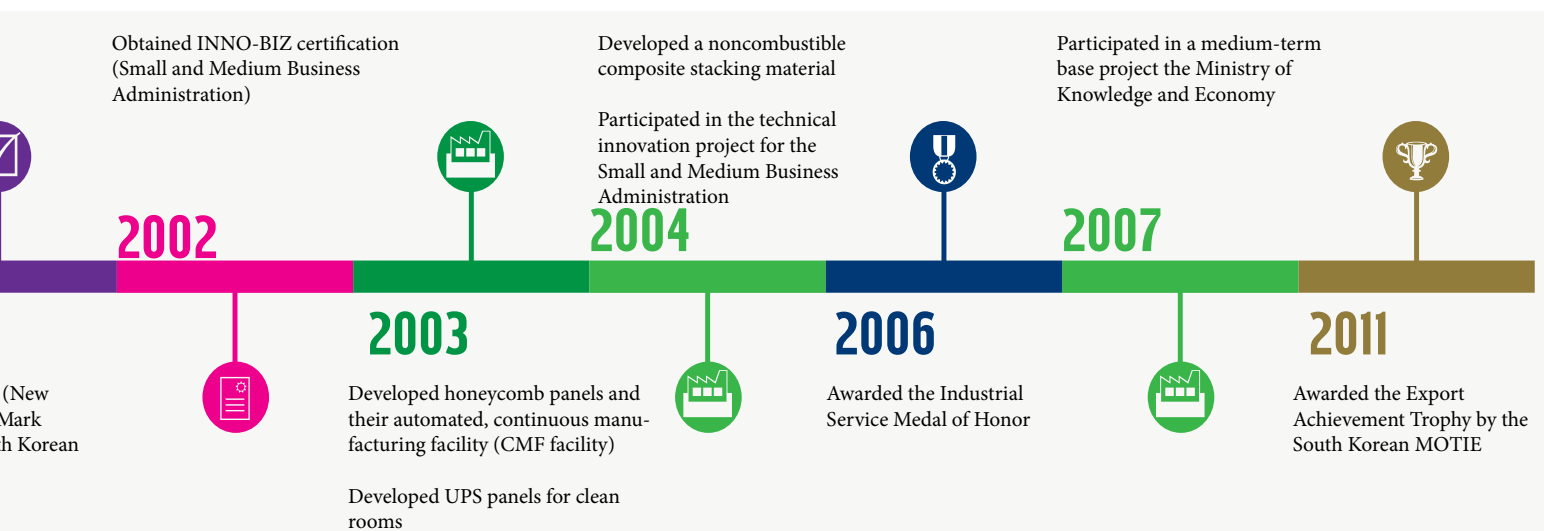
BEXCO, Busan Expo & Convention Center
Ilshin Architecture Design | 2001
Multiple Award Recipient
with Alucolam ACP Silver color 4mm 6,000m2

HISTORY





Gimpo International Airport
Domestic Terminal Remodeling
Gansam Architects, Inc. | Hanjin Heavy Industrial
2012 GPD Award Grand Prix GPD(Good Public Design) Foundation
2012 BIM INCENTIVE AWARD
with Alucolam ACP FR Silver metallic 34,000m2





Six Key Benefits of the Alucolam Brand

New Doha International Airport | using Alucolam ACP

Alucolam is the brand to trust when quality and service of the highest standards are expected.

1. Light Weight

Alucolam ACP is comprised of a top and bottom PVFD coated aluminum coil sheet (0.5mm) and a lightweight yet durable (3mm or 5mm) Fire Rated mineral core fused together using an automated patented proprietary bonding lamination method. In order to avoid the effect of oil canning, consistent thickness of single skin panels are adhered to.

2. Flatness

Single skin aluminum sheets, iron sheets, enamel steel sheets, and zinc-plated steel sheets are similar in appearance to ACM. To achieve equal flatness of ACM, the thickness required makes these options far too costly and heavy. Our superior flatness combined with proper fabrication methods leaves no chance of an oil can appearance common with single skin panels.

3. Insulation

The core material in these panels is a patented Fire Rated mineral and polymer binding agent that is a critical element for the Fire Rated insulation of composite panels. The core material acts as a thermal break between the face sheet and building structure which results in far superior thermal performance over single skin panels.

4. Durability

The surface of Alucolam ACP uses the KYNAR-500 series, which are polymer fluoroplastic paints that protect the panels from color degradation. The adhesive of these panels is Alucolam technology developed for shipping, rail and aerospace industry. Its performance satisfies the requirement for the exterior material of buildings, whose initial adhesive strength should ensure permanent weatherability. Alucolam product reliability has been demonstrated on countless projects completed since 1987.

5. Varied Processability

ACM planks are commonly fabricated into route and return rainscreen cladding assemblies. Alucolam's proprietary mineral core allows for ease of machining for the purposes of cutting, grooving, bending, rounding and punching. Ask your local sales rep for a sample to see how easily Alucolam FR planks can be machined.

6. Thirty Standard Colors & Unlimited Euromax Finishes Available

Based on our 30-year production experience of aluminum composite panels, we have defined a standard color system that includes the 30 colors most preferred by our customers. This enables Alucolam to quickly react to our customers' needs with a 30 day delivery promise from time of order to complete delivery. Full range of Euramax finishes are available upon request (extended lead times are required for specialty finishes). Custom colors are also available if needed.



Preparing for your Project

Order Placement

Our commitment to a 30 Day order to delivery applies to standard color and standard size (62" x 196"). For color match, Euramax finishes, or custom sizes, extended lead times apply. For custom sizes (other than 62" x 196") that do not have basic colors and dimensions (width and thickness), please be aware that there may be variation between panel order lots and that some panels are directional. Please contact your local representative for more information.

Treatment and Storage

These panels must be stored horizontally on a cool and dry flat surface away from direct sunlight with good ventilation. When stacking planks, be sure that each stack overall weight does not exceed one ton. Fabricate planks within six months from the date of manufacture. The colors are subtly different depending on their lot. Even if the panels have the same lot, try to avoid using newly ordered panels together with aged planks in a project where the panels can be seen side by side.

Construction and Processing

1. When optimizing panel layout and confirming quantity, ensure metallic colors will be installed in the same direction as shown by the arrow on the protective film. Check with your local sales rep for additional plank size availability to optimize panel output. For panels with general solid colors, it is recommended that the same procedure described above be followed. If you ignore the direction of the panels, even panels with the same lot may look different due to the diffused reflection. Therefore, check the direction before installing the panels.
2. When processing the panels, do not remove the protection tapes, and be careful not to scratch their surfaces with the machine. After completing the installation of the panels and any silicone joints, remove the protection tapes as quickly as possible. If the protection tapes are exposed to direct sunlight for a long time, the adhesive on the tapes may cause contamination on the surface of the panels making full removal of the film very difficult.
3. When using tapes for silicon coating, paper tapes that contain a minimal component of solvents are recommended. The solvents may chemically react with the fluorine coating paint on the surfaces of the panels, which may damage them.
4. For the cleaning of buildings where the installation of panels has been completed, clean them one to two times a year with a soft cloth or sponge wet with weak soapy water (mild detergent such as Palmolive dish detergent). This will maintain the beautiful surfaces of the panels for a long time. When cleaning the exteriors of buildings, be sure not to use detergents containing acidic or alkaline components, MEK, trichloroethylene, thinner, or fluorine, which may remove the coating or may reduce the luster. Do not use abrasives and do not clean dry panels. Always use water for cleaning (similar to washing a car).



Flame Retardant Core

Features

- Flat panel that consists of two thin aluminium sheets bonded to a non-aluminium core
- Excellent flatness and light weight
- Aluminium sheets are coated with polyvinylidene fluoride (PVDF)
- Unlimited finishes available through Euramax (extended lead-times apply).
- Excellent durability and processability (rounding process)
- Smooth delivery system via processing after painting

Applications

- Interior and exterior panels, and ceiling materials for buildings
- Replacement for the exteriors of remodeled buildings
- Finishings of canopies, pillars, and columns
- Interior panels for electric locomotives

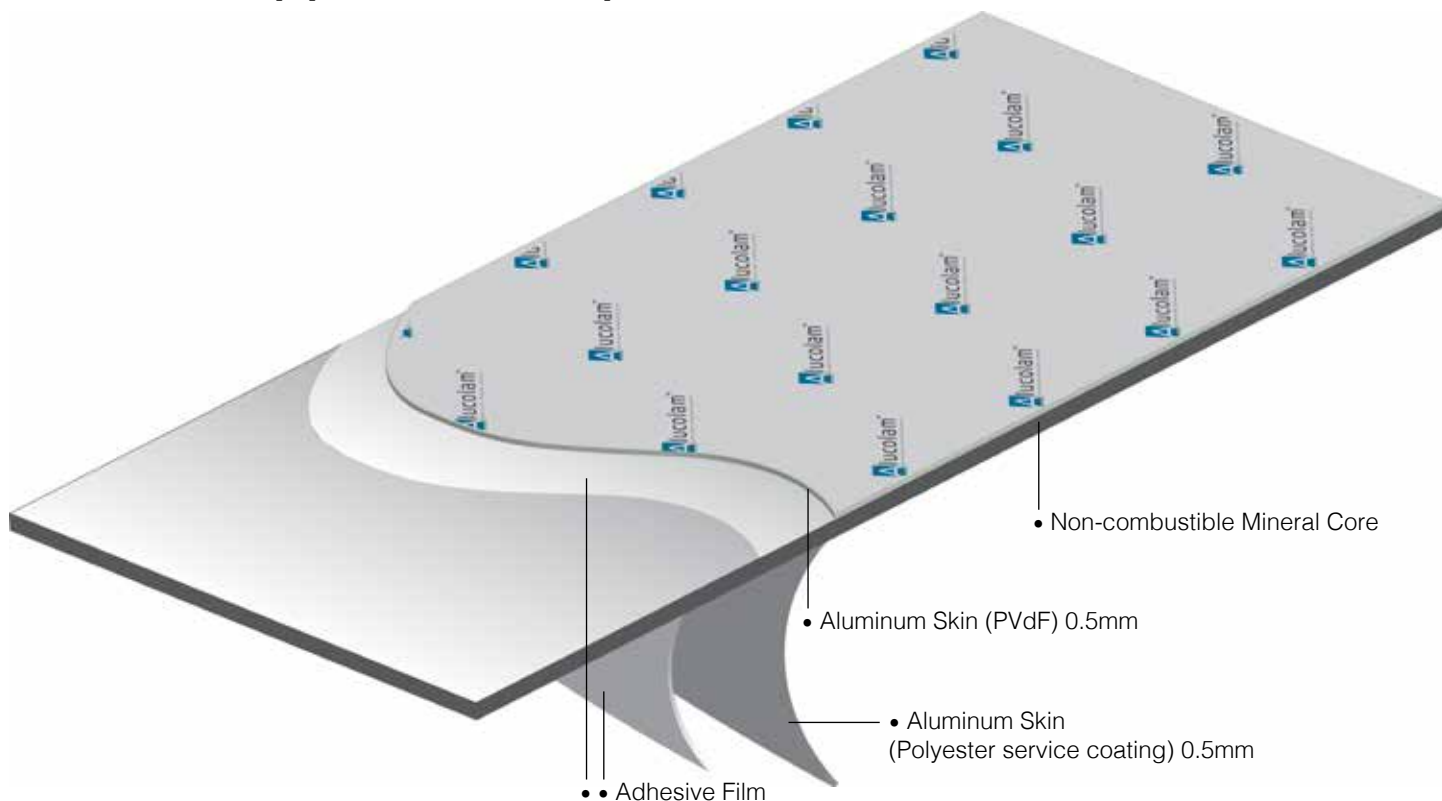
Installation Examples

- Interior panels for Gimpo International Airport Domestic Terminal Renovations
- Interior panels for New Doha International Airport & Al-Maktoum International Airport Dubai
- Ongoing project for the 6 stations of the northwest running SAR Riyadh-Qurayyat Line (owned by the Saudi Arabia Railway Company)

Fire Retardant Rating

Country	Performance	Grade	Qualification Institute	Test Method
USA	Non-combustible	passed	UL	UL 723
South Korea	Almost non-combustible	second	Fire Insurers Laboratories of Korea	KSF 2271
Singapore	Non-combustible	passed	PSB Testing Center	Part 7: class1 / Part 6: class 0
Japan	Non-combustible	passed	Japan Ministry of Construction	-
Russia	Non-combustible	K0	-	GOST 31251
China	Almost non-combustible	B1	-	-

As the global regulations on fire and construction material codes have been tightened, Alucolam has developed flame retardant, noncombustible aluminum composite panels. While the structure and composition of these panels are similar to those of our superseded Alucolam PE ACM incorporating a polymer resin core sandwiched between two aluminum sheets with a width of 0.5mm, the FR product line uses an inorganic material that features self-extinction properties to reduce smoke development in a fire.



Standard Dimensions

Composition	0.5 AL + 3.0 non-combustible core material + 0.5 AL	
Thickness	4.0mm	3.0, 5.0 and 6.0mm can be made available by order
Width	1020, 1250, 1575mm	The customized width must be more than 2500mm
Length	2000 ~ 5000mm	
Color	Standard color system	Fluorine coating (PVdF)

General Dimensions

Item	Measured Value	Unit	Tolerance
Thickness	4.0	mm	±0.2
Weight	7.1	kg/m ²	-
T-Peel	≥ 100	N/25mm	-
Tensile Strength	≥ 35	N/mm ²	400kg
Bending Strength	112.6	N/mm ²	More than 90
Annealing Test	No error	-20°C ~ 80°C / 60 cycle	No error
Elongation at Break	≥ 5	%	Less than 18
Fouling Resistance	5	Grade	More than grade 4

INSTALLATION EXAMPLES

Residential and Corporate Buildings



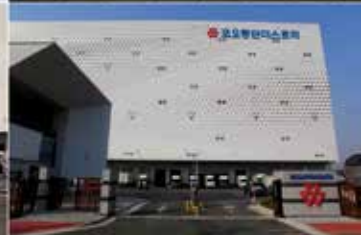
Hyundai Parkville | Korea Industrial Development
with Alucolam standard metallic Gold 4mm 23,000m2
Seoul 1999



Seongsu E-Mart Office | HAEAHN Architecture, Inc.
with Alucolam ACP, March 2008



Gangnam Finance Center
(formerly Star Tower)
with Alucolam ACP, 2001



Kolon Industries Integrated Service Center,
Dongtan with Alucolam ACP, April 2016

INSTALLATION EXAMPLES

Public Spaces



New Doha International Airport (NDIA)
Bechtel | HOK Hellmuth, Obata + Kassabaum
with Alucolam ACP, completed 2014



Sfunz Entertainment Complex
with Alucolam standard Silver 4mm 6,450m²
Daewoo Construction | Completed 2002



King Kanko 1000 Pachinko
Imaie Station, Nagoya March 2008
with Alucolam Fr white color 2,600m²

INSTALLATION EXAMPLES

Public Spaces



HDC Shilla l'PARK Duty Free Shop
Owner: Hyundai Development Company + Hotel Shilla
Hyundai Group & Samsung Group
Jun Mitsui & Associates Inc. Architects
with Alucolam ACP, March 2016



Vladivostok International Airport
with Alucolam ACP | 2012



Gangseo Sports Park, Busan
with Alucolam ACP | June 2002



BEXCO, Busan Expo & Convention Center
Ilshin Architecture Design | Multiple Award Recipient, completed 2001
with Alucolam ACP Silver color 4mm 6,000m2



Busan Gwangandaegyo Bridge
with Alucolam standard exotic
silver 4mm 7,400m2 for
soundproofing and
heat transmission benefits
March 2003

TECHNICAL DATA SHEETS

Alucolam FR 4 mm

Dimension Specification			
		Unit	
1. Thickness		mm	4.0
2. Front Skin Thickness, F		mm	0.5
3. Rear Skin Thickness, R		mm	0.5
4. Standard Core		mm	3.0
5. Weight		kg / m ²	7.1
6. Standard Width		mm	1020, 1250, 1575
7. Minimum / Maximum Length		mm	2000 ~ 6000
8. Thickness Tolerance		mm	±0.2

Mechanical Specification			
	Standard	Unit	
1. Flatwise Tensile Strength	848 PSI	MPa	≥ 3
2. T-Peel	ASTM D 1876	N/25mm	≥ 100
3. Flexural Modulus	ASTM C 393	MPa	≥ 40,000
4. Tensile Strength	ASTM E 8	N/mm ²	≥ 35
5. Elongation at Break	ASTM E 8	%	≥ 5
6. Acoustic Reduction, Rw	ISO 140-3	dB	28
7. Thermal Resistance	ASTM C 518	m ² k/W	0.009 ~ 0.011
8. Thermal Conductivity	ASTM C 518	W/mK	0.35 ~ 0.45
9. Linear Thermal Expansion	ASTM D 696	mm/m/100k	2.4x10 ⁻⁵
10. Temperature Stability		°C	-20 ~ +80
11. Climbing Drum Peel for Adhesives	ASTM D 1781-98	N mm/mm	125

Chemically Resistant & Weatherability			
	Standard	Unit	
1. HCl(5%)	ASTM D 1308	-	No change
2. H ₂ SO ₄ (5%)	ASTM D 1308	-	No change
3. Salt Spray	ASTM B 117	-	No change
4. Humidity	ASTM D 2247	-	No change
5. RoHS	IEC 62321	mg/kg	N.D. (Not Detected)

Aluminum Skin Sheet Specification			
	Standard	Unit	
1. Aluminum Alloy Grade	ASTM B 209	-	3003
2. Temper of Aluminum	ASTM B 209	H	16
3. Tensile Strength	ASTM B 209	N/mm ²	207 > Rm > 165
4. Elasticity Modulus	ASTM D 638	N/mm ²	70,000
5. 0.2% Proof Stress	ASTM B 209	N/mm ²	Rp 0.2 > 145
6. Elongation (A50)	ASTM B 209	N/mm ²	> 1
7. Gloss (60°)	ASTM D 523	%	25 ~ 40
8. Pencil-Hardness	ASTM D 3363	-	H ~ 2H
9. Abrasion Resistance	ASTM D 968	-	No change

Core Specification			
	Standard	Unit	
1. Density (23°C)	ASTM D 1505	g/cm ²	1.53 ~ 1.57
2. Tensile Strength	ASTM D 638	MPa	≥ 10
3. Elongation at Break	ASTM D 638	%	≥ 5
4. Thermal Conductivity	ASTM C 518	W / mK	0.39
5. Linear Thermal Expansion	ASTM D 696	mm / m / 100k	8.6x10 ⁻⁵
6. Limited Oxygen Index (LOI)	ASTM D 2863	%	≥ 37

Fire Behaviour			
1. Fire Propagation	BS 476, Part 6	-	Index 0
2. Surface Flame Spread	BS 476, Part 7	-	Class 1
3. Flame Spread	ASTM E 84	-	Passed
4. Smoke Developed	ASTM E 84	-	Passed
5. Fire Resistance Test	ASTM E119	min	72
6. Fire Flammability	UL V94	-	V0

TECHNICAL DATA SHEETS

Alucolam FR 6 mm

Dimension Specification			
		Unit	
1. Thickness		mm	6.0
2. Front Skin Thickness, F		mm	0.5
3. Rear Skin Thickness, R		mm	0.5
4. Standard Core		mm	5.0
5. Weight		kg / m ²	9.9
6. Standard Width		mm	1020, 1250, 1575
7. Minimum / Maximum Length		mm	2000 ~ 6000
8. Thickness Tolerance		mm	±0.2

Mechanical Specification			
	Standard	Unit	
1. Flatwise Tensile Strength	ASTM C 297	MPa	≥ 3
2. T-Peel	ASTM D 1876	N/25mm	≥ 100
3. Flexural Modulus	ASTM C 393	MPa	≥ 40,000
4. Tensile Strength	ASTM E 8	N/mm ²	≥ 25
5. Elongation at Break	ASTM E 8	%	≥ 3
6. Acoustic Reduction, Rw	ISO 140-3	dB	29
7. Thermal Resistance	ASTM C 518	m ² k/W	0.018 ~ 0.03
8. Thermal Conductivity	ASTM C 518	W/mK	0.2 ~ 0.32
9. Linear Thermal Expansion	ASTM D 696	mm/m/100k	-
10. Temperature Stability		°C	-20 ~ +80

Chemically Resistant & Weatherability			
	Standard	Unit	
1. HCl(5%)	ASTM D 1308	-	No change
2. H ₂ SO ₄ (5%)	ASTM D 1308	-	No change
3. Salt Spray	ASTM B 117	-	No change
4. Humidity	ASTM D 2247	-	No change

Aluminum Skin Sheet Specification			
	Standard	Unit	
1. Aluminum Alloy Grade	ASTM B 209	-	3003
2. Temper of Aluminum	ASTM B 209	H	16
3. Tensile Strength	ASTM B 209	N/mm ²	207 > Rm > 165
4. Elasticity Modulus	ASTM D 638	N/mm ²	70,000
5. 0.2% Proof Stress	ASTM B 209	N/mm ²	Rp 0.2 > 145
6. Elongation (A50)	ASTM B 209	N/mm ²	> 1
7. Gloss (60°)	ASTM D 523	%	25 ~ 40
8. Pencil-Hardness	ASTM D 3363	-	H ~ 2H
9. Abrasion Resistance	ASTM D 968	-	No change

Core Specification			
	Standard	Unit	
1. Density (23°C)	ASTM D 1505	g/cm ²	1.53 ~ 1.57
2. Tensile Strength	ASTM D 638	MPa	≥ 10
3. Elongation at Break	ASTM D 638	%	≥ 5
4. Thermal Conductivity	ASTM C 518	W / mK	0.39
5. Linear Thermal Expansion	ASTM D 696	mm / m / 100k	-
6. Limited Oxygen Index (LOI)	ASTM D 2863	%	≥ 37

Fire Behaviour			
1. Fire Propagation	BS 476, Part 6	-	-
2. Surface Flame Spread	BS 476, Part 7	-	-
3. Flame Spread	ASTM E 84	-	-
4. Smoke Developed	ASTM E 84	-	-
5. Fire Resistance Test	ASTM E119	min	-
6. Fire Flammability	UL V94	-	-



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