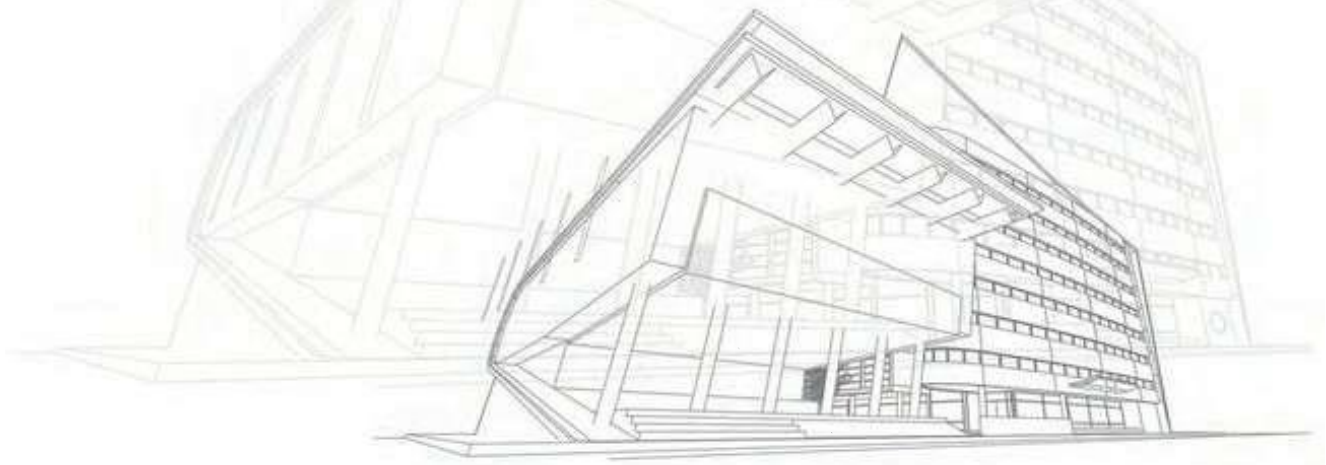
AludecoR
Metal Composite Panel

Story Between the Layers

A Technical Handbook on Metal Composite Panels

Volume 1.0



"To *give real service, you must*
add something
which cannot be bought
or measured with money”

- ***Sir M Visvesvaraya***

Aludecor
Metal Composite Panel

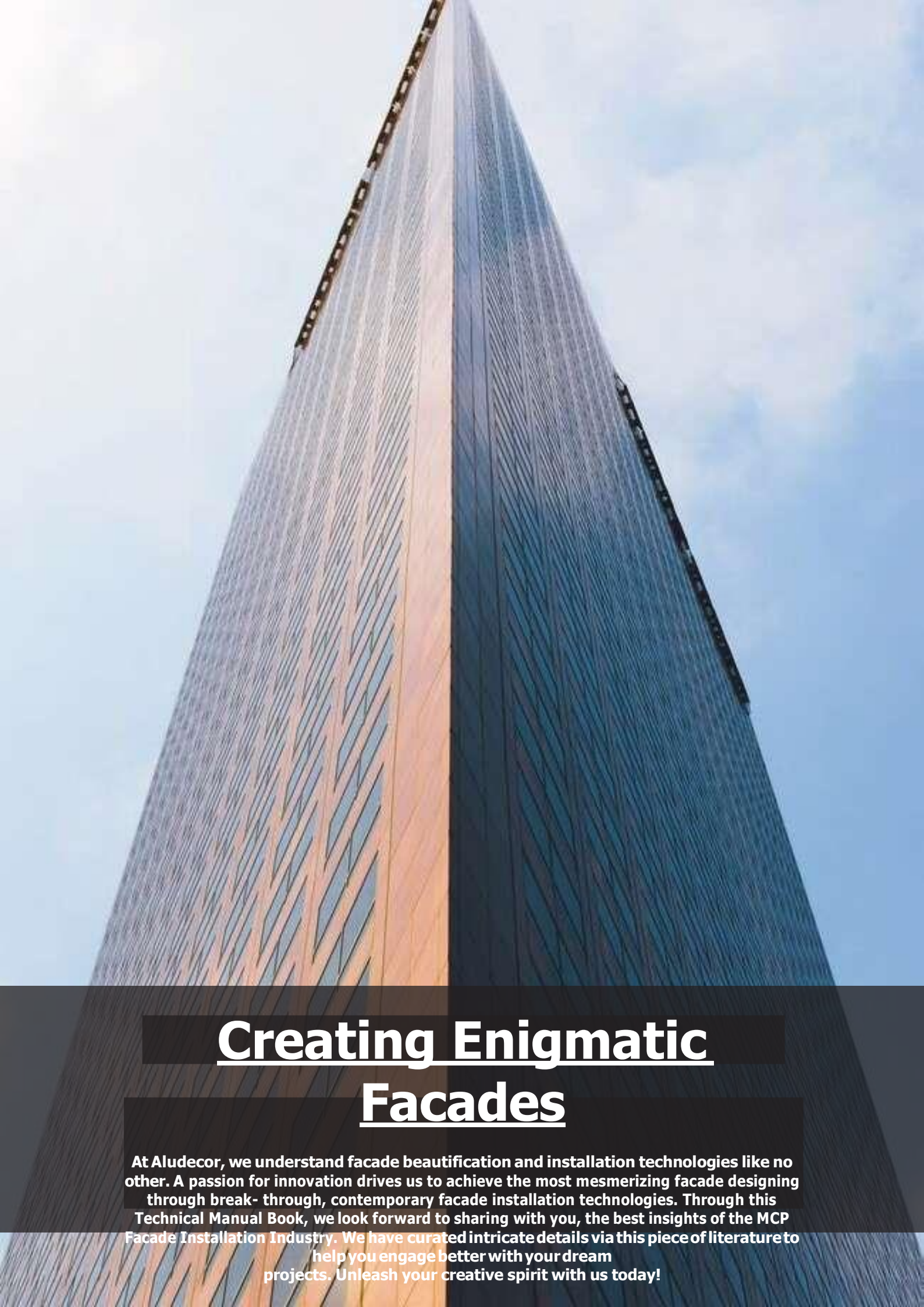
Technical

ABOUT ALUDECOR

Since its inception in 2004, Aludecor has remained a premium ACP sheet manufacturer in India, synonymous with trust and reliability. Aludecor Metal Composite Panel is the number one choice of Architects, Facade Technicians, and Space Designers. With a passion for innovation, Aludecor has maintained its stature in the Indian ACP Manufacturing Industry as a Thought Leader. The Company's end-to-end Aluminium Composite Panel Manufacturing portfolio is powered by a 500+ strong retail network. A presence in more than 250 cities and world-class Manufacturing Units in Haridwar, empower Aludecor to keep on introducing breakthrough products that have been creating benchmarks in the market for the past 15+ years.

As a "Made in India" brand, Aludecor produces all its ingenious products in-house. The Product Units support the Company with a production capacity of 5.5 million square meters per annum. An unshakeable commitment towards excellence has also let Aludecor cater to famous National and International clientele such as Hyundai, KFC, Toyota, Samsung, Tanishq, Aditya Birla Group, Amul, Maruti, Jaguar and many more.

Aludecor's ultimate commitment lies in holding forth its mission as an ethical and "green" company.



Creating Enigmatic Facades

At Aludecor, we understand facade beautification and installation technologies like no other. A passion for innovation drives us to achieve the most mesmerizing facade designing through break- through, contemporary facade installation technologies. Through this Technical Manual Book, we look forward to sharing with you, the best insights of the MCP Facade Installation Industry. We have curated intricate details via this piece of literature to help you engage better with your dream projects. Unleash your creative spirit with us today!

INDEX

Aludecor Lamination Line, Haridwar, Uttarakhand

Chapter 1

Introduction to Metal Composite Panels

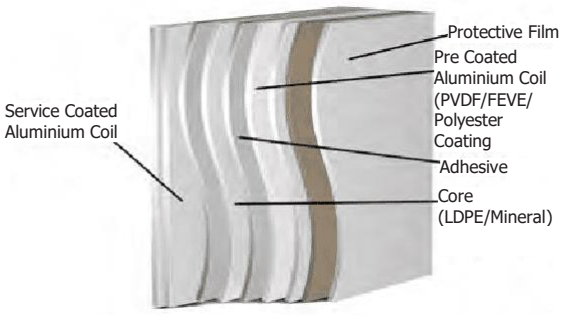
Introduction to **Metal Composite Panels**

Metal Composite Panels

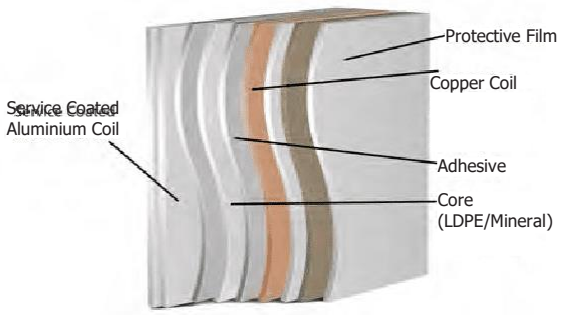
Metal Composite Panels are have several layers and the components of these layers will be separately discussed in the forthcoming Chapters.

The basic layer comprises top and bottom layer of Metal which can be pre-painted depending on the metal used. Aludecor uses Pre-painted Aluminium, Copper and Zinc for manufacturing of the Metal Composite Panels. Core of the material can be made of LDPE, Mineral Core.

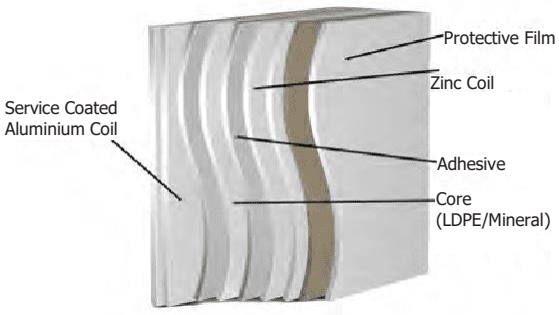
The layers of the Metal Composite Panels sold by Aludecor are as depicted below:



Aluminum Composite Panel



Copper Composite Panel



Zinc Composite Panel

Advantage Aludecor MCP

1. Flatness and Finish Brilliance in MCP

Metal Composite Panels are the best metal cladding products in terms of precision and consistency. Research studies on MCPs claim that it stays flat after installation. It requires no oil canning or wrinkling as the skins in it are bonded to the cure under tension producing a balanced panel.

MCPs are not only flat but also provide a consistent finish. Besides, MCPs can provide finishes in any colour as per the desires of the building owner or Architect. On the other hand, the natural unfinished look of Zinc and Copper also provide the added benefit, natural to these products.

The advanced paint technologies used in the MCP manufacturing process, eliminates the possibility of a checkerboard visual effectively on the exterior of the building. It ensures consistent finish from one to the next.

2. Unparalleled Brilliance and Highest Gloss Retention

Steel Applicator Roll at Aludecor's in-house state-of-the-art coating line, a technology of the highest international standard, ensures unparalleled brilliant effects in our metallic shades contrary to the out- put through the widespread use of rubber roller system in the industry. Internationally accepted FEVE and 70:30 ratios of the PVDF and acrylic resins in PVDF coating (the PVDF resin is of Kynar 500 / Hylar 5000) ensures the highest gloss retention in Aludecor MCPs.

3. Lead Free

If ACPs are not coated with lead-free paints, one can be exposed to the menace of lead poisoning. The infection can also get spread to others, and children are the most vulnerable. Long-term exposure to the highly carcinogenic lead affects the lungs, kidneys, liver and the nervous system. Use of lead-free paints in Aludecor's coating line successfully eliminates the possibility of lead poisoning.

4. Best Workability, Flexibility and Minimal Crack Risks

The Aluminium coils sourced in Aludecor are made with Direct Chill (DC) processed aluminium alloy ensuring best elongation property, finishing, flexibility and workability. It also minimizes the risk of cracks.

5. Innovation Quotient

Aludecor offers a versatile range of unique and patented digital technology enabled finishes and de- signs. Robust in-house R&D is backed by best international quality labs.

6. Double Coat Double Bake Line

It is a continuous and single line process that ensures zero elongation cracks on primer and paint sur- face. It also results in better bonding. Aludecor's Double Coat Double Bake Line is a pioneering initia- tive in India that enhances the longevity of ACPs in severe weather conditions.

7. Excellent Fire Fighter

Aludecor FireWall is process certified for Reaction to Fire by ewcl[5] as per EN 13501-1, Class A2-s1, d0 ClassB-s1, d0 and BS 476 Part 6 and 7 Class O.

Aludecor FireWall has also passed the ASTM E119-12 test for 2-hour resistance to fire. The test also

checks if the ACP disintegrates from the structure when water is sprayed through the fire hoses to bring the fire under control. FR ACP recycled content in Aluminium that Aludecor uses is 30% and Aluminium is recyclable upto 99.9%.

EN 13501-1 test validates that it will not contribute to the spreading of fire; that smoke production will be negligible and flaming droplets will turn to harmless ash particles. On clearing the test Aludecor- FireWall has received the A2-s1, d0 and B-s1, d0 fire classification.

8. Withstand Extreme Indian Weather Conditions

The Metal Composite Panel (MCP) systems act as a building envelope that protects against air and water infiltration. Moreover, these installations systems also eliminate the concerns over mould and mildew.

Spread over 25000 square metres, the fully-automated production units roll out high-quality products. All paints used are tested against the vagaries of nature. Furthermore, proper QC and in-house cutting-edge equipments for conducting tests conforming to international standard assure that all Aludecor products stand tough against severe weather conditions. Some of our products also come with a warranty of 25 years. We produce 0 Negative Tolerance materials for specific industry requirements, Aludecor MCPs truly stand the test of time.

9. Green Steps

Fully recyclable products including aluminium alloy which can be recycled for several other uses, are used to manufacture Aludecor MCPs. Aludecor collects all the scraps of Aluminium and sends it back to Sheet Manufacturer for producing Aluminium sheets which can be used again in the manufacturing of MCPs. They also have an Internal in-house process of recycling the core, where all the scrapped core are collected and sent to the shredder which forms the core into pellets so that it can again be used as raw material for the core. Natural products like CCM and ZCM (Copper and Zinc Composite Materials) with their high durability and long life also gives clean runoff in rainwater harvesting. Aludecor's production units are also equipped with Effluent Treatment Plants to make the water discharged free of contam- inants, before further drainage. Moreover, Coil Coating is the most environment friendly method for coating applications on aluminium panels.

10. Faster installation and Low Maintenance Cost

Installation of Metal Composite Panel costs lower as it can be installed faster than any other construction material. The light weight of the MCP lowers the use of the structural steel systems and therefore saves money as less support structure is needed.

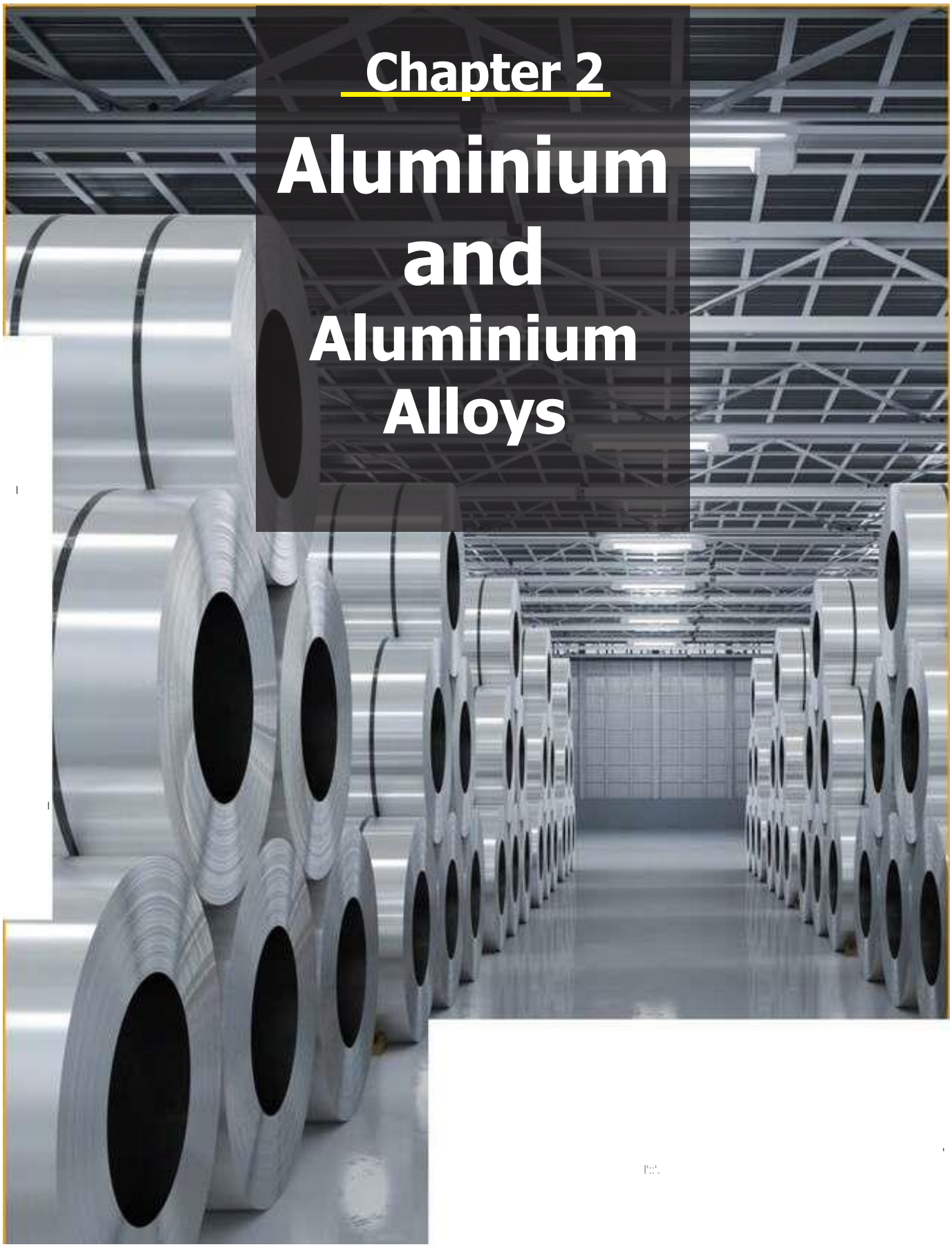
Today's Metal Composite Panels ensure and maintain the appeal and the property value for long term by retaining its lustre for decades. Moreover, the continuing improvements in technology of installation, paints and coatings, reduce the maintenance costs. The facilities cladded with MCP never look outdat- ed and hence, creates a diiference at the point of sale of the building. This creates a difference at the point of sale of the building.

11. The Cost Competitive Material

The increasing popularity of Metal Composite Panel is owing to its aesthetics and affordability.

Earlier, MCP systems were mainly used for high end projects. However, the developments in product and manufacturing technologies as well as fabrication and installation techniques, have made the MCP systems more cost-competitive.

Owing to the cost-competitiveness, these systems are installed on a wide variety of building applications, from major project wall panel systems to cornices and canopies, etc.



Chapter 2

Aluminium and Aluminium Alloys

Aluminium and Aluminium Alloys

Aluminium

About 1.5% by mass of Earth is aluminium. Aluminium metal is a relatively soft, durable, light weight, ductile and malleable metal. Its main advantage is its low density of 2.7 gm/cm^3 and it is completely recyclable.

Alloys

An alloy is a combination of metals and of a metal or another element. Alloys are used in a wide variety of applications. In some cases, a combination of metals may reduce the overall cost of the material while preserving important properties. In other cases, the combination of metals imparts synergistic properties to the constituent metal elements such as corrosion resistance or mechanical strength. Examples of alloys are steel, solder, brass, pewter, duralumin, bronze and amalgams.

Aluminium Alloys

Aluminium Alloys which are used in top and bottom of Aluminium Composite Panels are as below:

1. AA 1100
2. AA 3003
3. AA 3004
4. AA 3005
5. AA 3105
6. AA 5005
7. AA 5005A

The chemical composition of these alloys are as below in accordance to EN 573-3:

Alloy Series	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Ti	Ga	V	Alumin - ium
AA 1100	0.95	0.95	0.05-0.20	0.05				0.1				99%
AA 3003	0.6	0.7	0.05-0.20	1-1.5				0.1				Rest
AA 3004	0.3	0.7	0.25	1-1.5	0.8-1.3			0.25				Rest
AA 3005	0.6	0.7	0.3	1-1.5	0.2-0.6	0.1		0.25	0.1			Rest
AA 3105	0.6	0.7	0.3	0.3-0.8	0.2-0.8	0.2		0.4	0.1			Rest
AA 5005	0.3	0.7	0.2	0.2	0.5-1.1	0.1		0.2				Rest
AA 5005 A	0.3	0.45	0.05	0.15	0.7-1.1	0.1		0.25				Rest

In the chemical composition of the Alloys in accordance to Aluminium Composite Panels the main ingredient to be checked is Magnesium (Mg)

Magnesium

The addition of magnesium markedly increases the strength of aluminium without unduly decreasing the ductility. Corrosion resistance and weldability are good.

Technical

For the above reasons AA 3105 and AA 5005 were chosen as the best alloys for exterior conditions in ACP and is being widely used.

Temper

These alloys are used in accordance to its temper. The tempers come under two principal groups:

Non-heat treatable alloys - Alloys whose strength/mechanical properties are achieved by cold working (rolling, extruding, etc.). Sometimes called work hardening alloys, Temper is denoted by letter H.

Heat treatable alloys - Alloys whose strength/ mechanical properties are achieved by heat treatment followed by cooling and natural or artificial ageing. Temper denoted by letter T.

For ACP's we use non-heat treatable alloys.

Non-Heat Treatable Alloy Designations

Term	Description
H1X	Work hardened
H2X	Work hardened and partially annealed
H3X	Work hardened and stabilized by low temperature treatment
H4X	Work hardened and stoved
HX2	Quarter-Hard
HX4	Half-Hard
HX6	Three-quarter Hard
HX8	Fully Hardened

Back Support Material and Stiffeners

The Alloys used for back support material and stiffeners shall be of the below grades:

1. AA 6063
2. AA 6065

The chemical composition of these alloys are as below in accordance to EN 573-3

Alloy Series	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Ti	Ga	V	Alumin - ium
AA 6063	0.2-0.6	0.35	0.1	0.1	0.45-0.9	0.1		0.1	0.1			Rest
AA 6065	0.4-0.8	0.7	0.15-0.40	0.15	0.8-1.2	0.5		0.25	0.1			Rest

Temper of these Alloys are of Heat Treatable Alloys

Heat Treatable Alloy Designation

Term	Description
T1	Cooled from an elevated temperature and naturally aged
T2	Cooled from an elevated temperature, cold worked and naturally aged
T3	Solution heat treated, cold worked and naturally aged
T4	Solution heat treated and naturally aged to a substantially stable condition
T5	Cooled from an elevated temperature shaping process and artificially aged
T6	Solution heat treated and artificially aged
T7	Solution heat treated then stabilised
T8	Solution heat treated, cold worked then artificially aged
T9	Solution heat treated, artificially aged and cold worked
T10	Cooled from an elevated temperature, artificially aged then cold worked

Mechanical Properties of Alloys

The mechanical properties of these alloys are in accordance to their chemical composition and temper chosen. The alloys are chosen by the customer but some of the properties in accordance to EN 485-2 are listed below for sheet thickness upto 0.5mm (Annexure 1 has tables from EN 485-2. Check the exact chemical values in accordance to Temper and thickness of sheet there).

Alloy Series	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A_{50} %
AA 1100	120 - 150	80 - 125	2 - 4
AA 3003	120 - 190	90 - 150	2 - 4
AA 3004	190 – 285	155 - 230	2 - 4
AA 3005	145 – 220	130 - 160	2 - 4
AA 3105	145 - 220	130 - 160	2 - 4
AA 5005	145 - 205	80 - 165	2 - 4
AA 5005 A	145 - 205	80 - 165	2 - 4

Tensile Strength

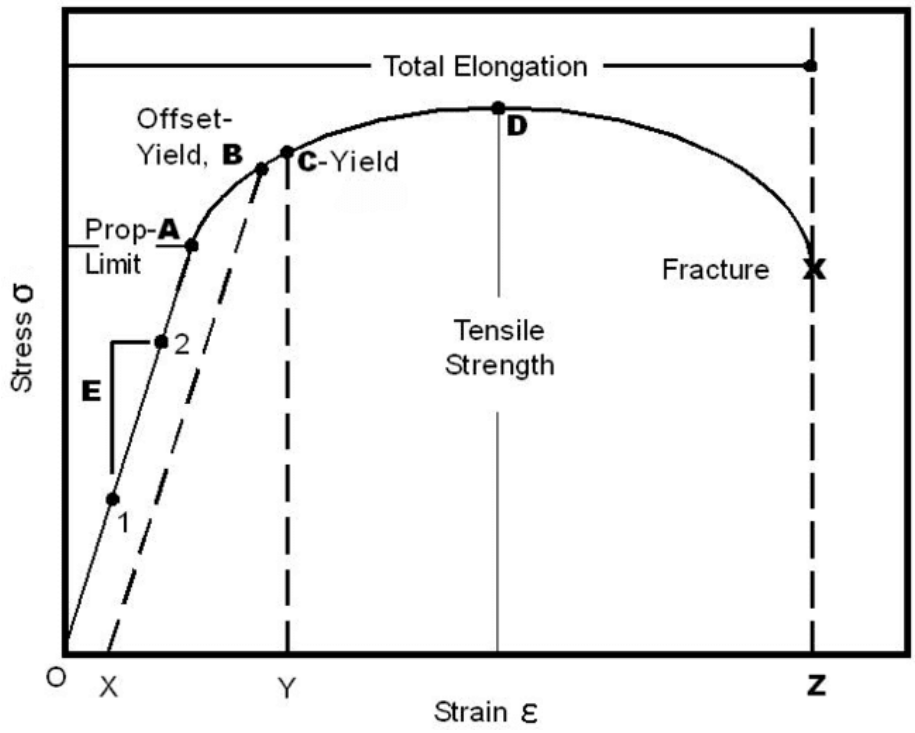
It is the capacity of a material or structure to withstand loads tending to elongate. Tensile strength is measured by the maximum stress that a material can withstand while being stretched or pulled before breaking. It is measured in Newton per square millimetre or N/mm^2.

Yield Strength

It is the material property defined as the stress at which a material begins to deform plastically whereas yield point is the point where nonlinear (elastic + plastic) deformation begins. Prior to the yield point the material will deform elastically and will return to its original shape when the applied stress is removed. Once the yield point is passed, some fraction of the deformation will be permanent and non- reversible. It is also measured in Newton per square millimetre or N/mm^2.

Elongation

Increase in length which occurs before a metal is fractured, when subjected to stress. This is usually expressed as a percentage of the original length and is a measure of the ductility of the metal.



Stress Strain Curve

Universal Testing Machine

Chapter 3

Zinc & Copper

Zinc & Copper

Aludecor also Manufactures Zinc Composite Panels and Copper Composite Panels.

Why Zinc?

Zinc is reported to be the 23rd most abundant element in the earth's crust. It is a non-ferrous metal that is not susceptible to rust or corrosion: It's weatherproof, seismic proof, corrosion resistant, and immune to the harmful effects of UV rays, ensuring a very long service life without degradation.

This is possible because architectural zinc develops its own protective layer, which is called zinc hydroxyl-carbonate. Once it's formed, that layer blocks moisture and chemicals from penetrating the zinc and, if it's scratched, the hydroxyl-carbonate will reform over time. In other words, zinc heals itself. That's why zinc walls and roofs last on average from 80 to 100 years. Zinc also requires very little energy to manufacture and little to no maintenance, and it is 100 percent recyclable from new construction scrap to the time it reaches its end use.

Aludecor uses Zinc Copper Titanium Alloy which has all the properties of Zinc. Copper increases mechanical resistance of the alloy by making it harder and stronger. Titanium increases creep resistance of the material without having any metal fatigue.

Why Copper?

The history of copper in architecture can be linked to its durability, corrosion resistance, prestigious appearance, and ability to form complex shapes. From cathedrals to castles and from homes to offices, copper is used for a variety of architectural elements, including roofs, flashings, gutters, wall cladding, and building expansion joints.

As an architectural metal, copper provides excellent corrosion resistance. Copper surfaces form tough oxide-sulfate patina coatings that protect underlying copper surfaces and resist corrosion for a very long time.

Extensive worldwide tests have proved that uncoated copper and copper alloys (e.g., brass, bronze, copper nickel, copper-nickel-zinc) have strong intrinsic antimicrobial properties with efficacies against a wide range of disease-resistant bacteria, molds, fungi and viruses. Copper handrails, counter tops, hallways, doors, push plates, kitchens, and bathrooms are just some of the antimicrobial products approved for hospitals, airports, offices, schools, and army barracks to kill harmful bacteria.

Performance, maintenance, service life, and recovery costs from recycling are factors that determine the cost effectiveness of building components. While copper's initial cost is higher than some other architectural metals, it usually does not need to be replaced during the life of a building. Due to its durability, low maintenance, and ultimate salvage value, the additional cost for copper may be insignificant over the life.

Chapter 4

Coil Coating/Paint

Paint Consists of the Following Components:

1.Pigment:

A **pigment** is a material that changes the color of reflected or transmitted light as the result of wavelength-selective absorption. This physical process differs from fluorescence, phosphorescence, and other forms of luminescence, in which a material emits light. **Pigments** are of two types for Aluminium Coating:

Inorganic Pigments and Organic Pigments

Inorganic **Pigments** have Earthen Colors, which is highly durable. Organic **Pigments** on the other hand have more gloss/shine with less durability.

2. Solvent:

The main purpose of the **solvent** is to dissolve the polymer and adjust the viscosity of the paint. It is volatile and does not become part of the paint film. It also controls flow and application properties, and in some cases can affect the stability of the paint while in liquid state. Its main function is as the carrier for the non-volatile components. To spread heavier oils (for example, linseed) as in oil-based interior house paint, a thinner oil is required. These volatile substances impart their properties temporarily— once the **solvent** has evaporated, the remaining paint is fixed to the surface.

3. Binder (Resin):

The **binder** imparts properties such as gloss, durability, flexibility, and toughness. **Binders** which are used in the paints for Aluminium Coating are as below:

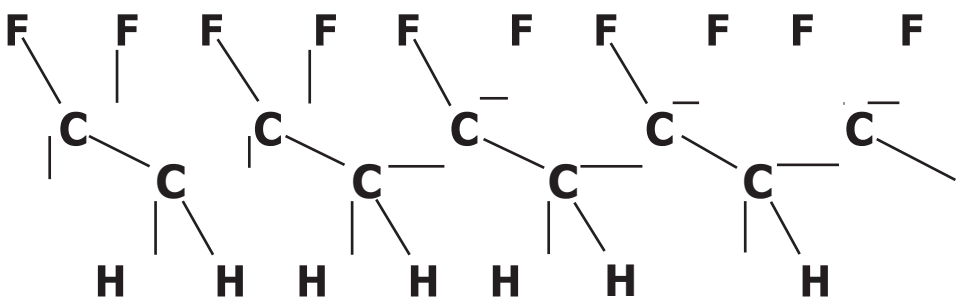
Fluoropolymers like PVDF and FEVE are to be used for Exterior applications; modified Polyesters with high UV resistance such as SDP can also be used. For Interior Applications Polyester has all the properties.

Technical

Poly Vinyl Diene Fluoride PVDF

Polyvinylidene fluoride is a high-molecular weight, semi-crystalline polymer that has many unique properties, including:

- Exceptional weathering resistance
- Resistance to UV light
- High thermal and chemical resistance
- Resistance to nuclear radiation
- High mechanical strength and toughness
- High purity
- Good moisture and fungus resistance
- High electrical resistivity
- Low surface energy and low coefficient of friction to provide a maintenance-free, dirt-resistant, non-staining coating surface
- Low refractive index



Chemical structure of

Polyvinylidene fluoride based coatings with a minimum of 70 wt% PVDF resin routinely exhibit excellent performance in severe accelerated tests designated by various technical associations. Typical performance in some of these tests is given below:

Figure 1

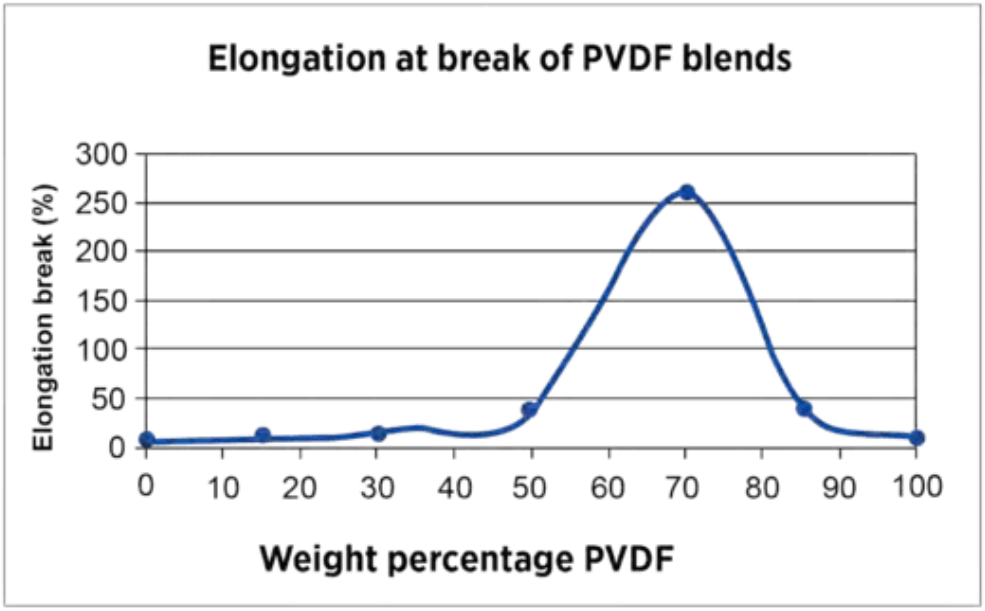
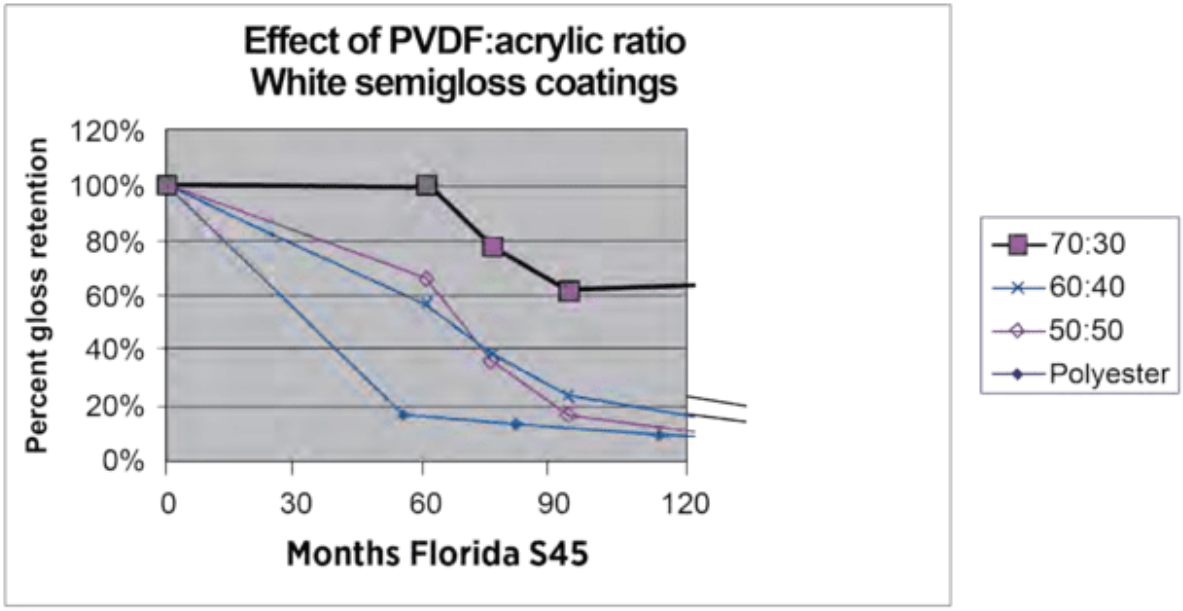


Figure 2

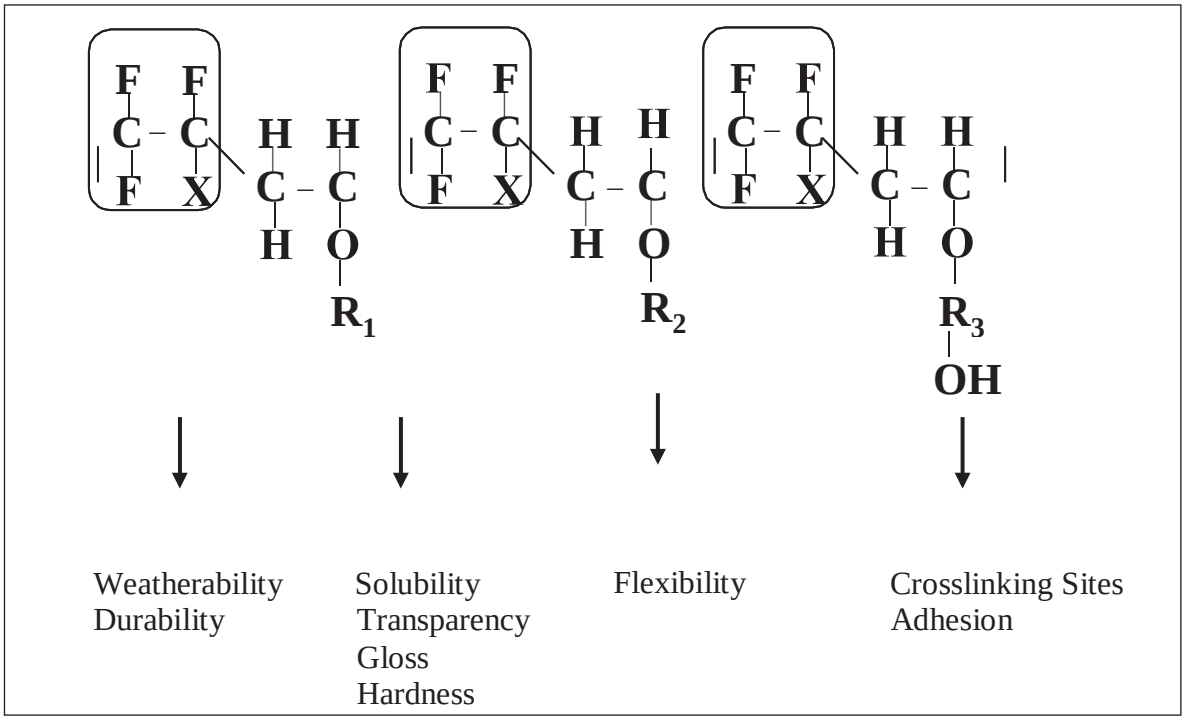


Technical

A key paint property that depends on the PVDF: Acrylic ratio is weatherability. The PVDF resin itself is highly inert, both chemically and photo-chemically, due to the high stability and protective effect of the C-F bond. Acrylic resins, on the other hand, contain ester and possibly other functional groups. These groups are more sensitive both to photochemical degradation,and to other degradation processes such as hydrolysis. In the United States, the weatherability of architectural coatings is typically tested in South Florida. The combination of high UV levels and humidity in this sub-tropical location provides a very severe test of coating weatherability. Figure 2 above shows how a number of white coatings have performed after 10 years in Florida. It may be seen that the 70% PVDF coating maintains gloss well. PVDF-based coatings with lower levels of PVDF did not do as well, and lost about half their gloss after 5 years. A polyester coating, by contrast, had less than 20% gloss retention after 5 years. This performance is very typical for polyesters. Based on many field experiments, it appears that even the best polyester paints can survive no more than about four or five years in a humid, sub-tropical environment, before significant gloss loss and chalking occur. This may be due both to the photochemical degradation of the polyester polymer backbone, and to the degradation of the crosslinks. Many of these structural features are also shared by some other kinds of fluoropolymer coatings, such as fluorinated ethylene vinyl ether (FEVE) coatings. However, the PVDF resin does not share these features, and is more highly fluorinated and more inert—which may explain its superior weatherability.

Fluoroethylene Vinyl Ether FEVE

The FEVE resins are usually reacted with aliphatic isocyanates to form cross linked FEVE coatings. FEVE based fluoropolymer coatings take advantage of the carbon/fluorine bond, which is extremely difficult to break. Carbon-fluorine bonds can absorb much greater amounts of UV energy and will keep this energy from affecting the weaker bonds/linkages in the FEVE resin polymer structure. Ultra-weatherability, durability, and chemical resistance are derived from the distinctive alternating fluorinated units



Chemical structure of FEVE

Both PVDF based systems and FEVE resin based powders retain their color and gloss extremely well and will meet and exceed the weathering performance requirements of AAMA 2605.

However with FEVE based powder coatings higher gloss finishes are available. The PVDF resins are much more limited in the range of gloss they can achieve as Kynar acts like a matting agent. Because the Carbon-Fluorine bond is part of the resin system in FEVE based systems there is no matting effect.

Manufacturers of PVDF based powders will tell you that PVDF is the superior system and will have data to prove it. Manufacturers of FEVE resin based powders will tell you that FEVE is the superior system and will also have data to prove it. The truth, as always, is somewhere in between. The fact is, both products work well, offer great protection and warranties and are an excellent coating choice.

Super Durable Polyester SDP

Super durable Polyester Coatings include a series of thermosetting powder coatings designed specifically for architectural Aluminium applications where colour and gloss retention are critical. Super Durable Polyester are formulated with advanced polyester resin technology and high performance pigments to conform with and often exceed the performance requirements of AAMA 2604-05 (specification for Superior Performing Organic). Super Durable Polyester coatings are designed to offer superior gloss and colour retention combined with maximum film integrity to ensure long term cosmetic and functional protection when compared with standard (Durable) polyester powder coatings.

AAMA 2605-13 defines the performance of superior performing coatings requiring higher performance levels than the other AAMA standards in the following areas:

- **Dry Film Thickness (Spray)**

1. 80% of measurements ≥ 30 microns (1.2 mil) on exposed surfaces
2. Individual readings may be as low as 25 microns (1.0 mil)
3. No more than 5% of readings on exposed surfaces shall be below 25 microns (1.0 mil) or 85% of film thickness

- **Dry Film Thickness (Coil Coat)**

1. 80% of measurements ≥ 23 microns (0.9 mil)
2. No more than 5% of readings on exposed surfaces shall be below 19 microns (0.75 mil) or 83% of film thickness specified

- **Humidity Resistance Testing** – 4000 hour exposure with no more than "few" blisters Size No. 8
- **Cyclic Corrosion Testing** – 2000 hour exposure to cyclic fog/dry testing with minimum rating of 7 on scribe or cut edge and minimum blister rating of 8.
- **Outdoor weather exposure testing in South Florida for at least ten (10) years**
- **Color Retention –** Delta E ≤ 5 units (Hunter) after ten (10) years exposure in South Florida
- **Chalk Rating –** Chalking shall be no less than No. 8 rating after ten (10) years exposure in South Florida.
- **Gloss Retention –** Minimum 50% after ten (10) years exposure in South Florida
- **Coating Erosion –** Less than 10% film loss after ten (10) years exposure in South Florida

Chapter 5
Core

Core

There are two type of cores used in Metal Composite

- Low Density Polyethylene (LDPE) Core
- Mineral Core

Low Density Polyethylene (LDPE)

After its experimental preparation in the 1930s, the application in high frequency radar cables during World War II, gave impetus to its commercial production. This thermoplastic is available in a range of flexibilities depending on the production process. High density materials are the most rigid. The polymer can be formed by a wide variety of thermoplastic processing methods and is particularly useful where moisture resistance and low cost are required. Polyethylene is limited by a rather low temperature capability (200-250 F) but is manufactured in billions of dollars per year.

Advantages:

1. Low cost
2. Impact resistant from -40 C to 90 C
3. Moisture resistance
4. Good chemical resistance
5. Food grades available
6. Readily processed by all thermoplastic methods

Disadvantages and Limitations:

1. High thermal expansion
2. Poor weathering resistance
3. Subject to stress cracking
4. Difficult to bond
5. Flammable
6. Poor temperature capability

In the Metal Composite Industry because of the various architectural applications in the building and LDPE being highly flammable and toxic during the course of fire, the community has started limiting the use of LDPE Core and are moving towards Mineral Core.

Mineral Core

Mineral Core is made from mixing non halogenated inorganic content in different proportions to enhance the fire properties of the core.

There are two ratings to be checked for Core as well as complete MCP

1. Reaction to Fire
2. Resistance to Fire

In reaction to fire we need to check the following properties:

1. Flame Height
2. Fire Propagation
3. Smoke Produced
4. Toxicity Levels in Smoke Produced
5. Molten Droplets produced if any
6. Heat Released

In resistance to fire we need to check the following properties:

1. Rise in temperature on the other end of the surface
2. The material shouldn't lose its integrity and start falling off, in case of fire
3. In real fire scenarios would the fire propagate to different floors
4. If water hose stream is pushed on the ACP Façade it should remain intact

There are two non-halogenated materials being used for the above characteristics:

1. Aluminium Tri Hydrate **(ATH)**
2. Magnesium Hydroxide **(MDH)**

ATH: It is the heat sinking and endothermic dehydration characteristics that enables alumina trihydrate to retard the burning of polymers. At approximately 220°C (428°F) about 35 percent of ATH is released in the form of steam. This water vapor quenches the surface of the surrounding materials while restricting the access of oxygen to the burning polymer. Combustible and potentially toxic off-gases are also diluted by this water vapor.

$$2Al(OH)_3 \rightarrow Al_2O_3 + 3H_20$$

Because alumina trihydrate contains no halogens or heavy metals, it's better for environmental compliance than flame retardants based on antimony metal or chlorinated and brominated (halogenated) compounds. Arc-track resistance in electrical composites is improved by the use of ATH. The heat generated by high arc temperatures is absorbed by the alumina trihydrate. When endothermic

dehydration occurs the water vapor slows the surface degradation of the polymer and the resultant formation of the carbonized film, or track.

MDH: While ATH is an effective flame retardant / smoke suppressant for many resins, there are limits to its use. The main limitation results from its thermal stability in applications where processing temperatures exceed 220°C (428°F). Hence the development of magnesium hydroxide, $Mg(OH)_2$, as a flame retardant. MDH functions in the same manner as ATH, however, there is one important difference: it undergoes endothermic decomposition with water release at 330°C (626°F).

$$\mathbf{Mg(OH)_2 \rightarrow MgO + H_2O}$$

The endothermic decomposition of $Mg(OH)_2$ which occurs during combustion is its flame retardant mechanism. For combustion to occur there must be fuel, oxygen and heat. By absorbing some of the heat, MDH prevents or delays ignition and retards combustion of the polymeric material. The water released during decomposition has the effect of diluting the combustible gases and acting as a barrier, preventing oxygen from supporting the flame.

When heated to decomposition, both ATH and MDH release water of hydration that quenches the polymer and dilutes smoke. It is this release water of hydration that quenches the polymer and dilutes smoke. ATH releases about 35% of its weight in water vs 31% for MDH. The process of endothermic decomposition also removes heat thus helping to retard combustion. MDH absorbs more heat (328 cal/g) than ATH (280 cal/g) on the same weight basis. Therefore, higher thermal stability and greater heat removal capacity make MDH a very effective flame retardant.

Aludecor uses MDH as fire retardant for producing FR Core

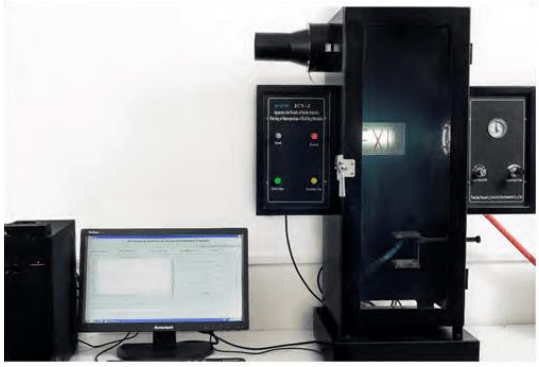
Aludecor's Mineral Core Production Unit

Technical

Aludecor's Fire testing equipments :

Bomb Calorimeter Testing Equipment

Non Combustibility Test



Smoke Density Test

Ignitability Test

Limiting Oxygen Index

Fire Codes for MCP

For Reaction to Fire globally and in India following codes are followed:

- Indian Standard IS 12777
- British Standard BS 476 Part 6&7
- German Standard DIN 4102
- European Norms EN 13501-1

Properties to check fire codes

	EN13501-1 Class A2	EN13501-1 Class B	DIN 4102 Class B1	BS 476 Part 6&7 Class 0	IS 12777 Class 1
Country	Europe	Europe	Germany	Britain	India
Flame Height	✓	✓	✓	✓	✓
Fire Propagation	✓	✓	✓	✓	×
Smoke Density	✓	✓	×	×	×
Molten Burning Droplets	✓	✓	✓	×	×
Heat Released	✓	✓	×	×	×

✓ Test Conducted × Test Not Conducted

From the above table we can derive that the best standard for reaction to fire is European Norms EN 13501-1

Aludecor has FPC for EN 13501-1 Class A2 and Class B. Also it has FPC for BS 476 Part 6&7 Class O.

For Resistance to Fire globally following standards are being followed:-

- American Standard ASTM E119 -12
- NFPA 285
- British Standard BS 8414-1

Chapter 6

Design Guidance

Design Guidance

For designing Metal Façade with ACP, the criteria are:

- Windload
- Tensile Strength of ACP and Aluminium Extrusion.
- Deflection of ACP and Aluminium Extrusion.

Windload is a major factor for designing ACP Panel for the façade.

Aludecor ACP comes in three thicknesses:

1. 3mm
2. 4mm
3. 6mm

For Interior application any type of ACP can be used, as there is no windload or external atmospheric condition, but core to be chosen wisely according to the building norms, so that we can have safe haven for inhabitants. The basic characteristics of the three ACP thicknesses for exterior application are as below:

Technical

Product Types	Skin Thickness (mm) Top & Bottom	Panel Thickness (mm)	Core Thickness (mm)	Tensile Strength Skin(N/mm²)	Elastic Modulus (N/mm²)
AL45 D	0.5	4	3	150	39800
AL45	0.5	4	3	150	39800
AL 445	0.45	4	3.1	150	38500
AL43 D	0.3	4	3.4	150	25500
AL43	0.25	4	3.5	120	24200
AL33 D	0.3	3	2.4	150	30500
AL33	0.25	3	2.5	120	29100
AL65	0.5	6	5	150	29100
AL63	0.25	6	5.5	120	21500

Note:

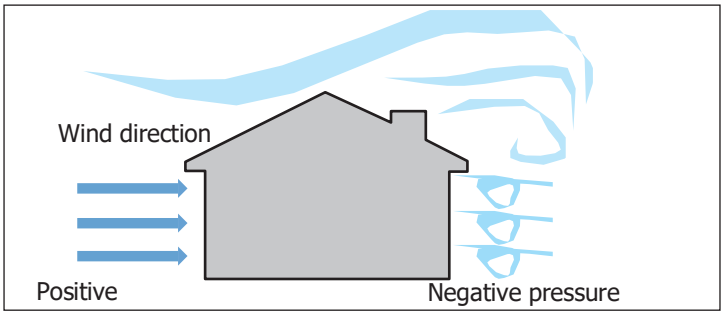
1. 0.25mm coil is made from AA1100 alloy
2. 0.3mm and above coil can be from AA3105/3004/5005 alloy
3. So average minimum tensile strength and Elastic Modulus is taken for design purposes
4. For more product details kindly visit our website www.aludecor.com

Recommendations:

1. For exterior application it is recommended to use only 4mm thick ACP with 0.5mm thick top and bottom coil.
2. It is not recommended to use 3mm thick ACP with 0.25mm coil for buildings beyond 10m height.

Calculation of Wind Load

In Accordance to IS 875 (Part 3) (Some excerpts for calculation taken for complete criteria's kindly go through the code)



Design Wind Speed (Vz):

The basic wind speed for any site shall be obtained from IS 875 (Part3)and shall be modified to include the following effects to get design wind speed.

Vz at any height, Z for the chosen structure:

1. (a) Risk level,
2. (b) Terrain roughness and height of structure,
3. (c) Local topography, and
4. (d) Importance factor for the cyclonic region.

It can be mathematically expressed as follows:

$$V_z = V_b k_1 k_2 k_3 k_4$$

Where,

V_z = Design wind speed at any height z in

m/s, k_1 = Probability factor (risk coefficient)

k_2 = Terrain roughness and height

factor k_3 = Topography factor

and k_4 = Importance factor for the cyclonic region

NOTE: The wind speed may be taken as constant upto a height of 10m. However, pressures for buildings less than 10m high may be reduced by 20% for stability and design of the framing

Design Wind Pressure (pd): The wind pressure at any height above mean ground level shall be obtained by the following relationship between wind pressure and wind speed

$$p_z = 0.6V_z^2$$

Where,

p_z= wind pressure in N/m² at height z

V_z= design wind speed in m/s at height

z

The design wind pressure p_d can be obtained as,

$$p_d = K_d K_a K_c p_z$$

Where,

K_d= wind directionality

factor K_a= area averaging

factor K_c= combination

factor

Wind Load on Individual Members (F): When calculating wind load on individual cladding units and their fittings, it is essential to take account of the pressure between opposite faces of such elements or units. For clad structures it is therefore, necessary to know the internal pressure as well as the external pressure. Then the wind load F acting in a direction normal to the individual structural element or cladding unit is

$$F = (C_{PE} - C_{PI}) A p_d$$

Where,

C_{PE}= external pressure coefficient

C_{PI}= internal pressure coefficient

A= surface area of cladding unit

p_d= design wind pressure

Note

1. If the surface design pressure varies with height, the surface areas may be subdivided so that specified pressure are taken over appropriate areas
2. Positive wind load indicates force acting towards the element (pressure) and negative away from it (suction)

For Calculating Max stress and Deflection on Panel

We need to check the Max. Stress on ACP Panel as per size and thickness

$$\text{Max Panel Stress } \sigma_{max} = \beta * w * b^2 / T^2$$

Where,

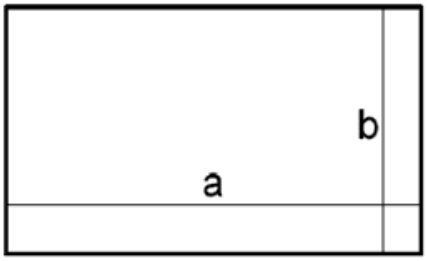
w = wind load

b = smallest panel dimension

β = to be calculated from below table of a/b ratio

T^2 = (Panel Thickness³- Core Thickness³)/Panel Thickness

	a/b	1	1.2	1.4	1.6	1.8	2	above
Fixed Supports all 4 Sides	β	0.30784	0.3834	0.4356	0.468	0.4872	0.4974	0.5
	α	0.0138	0.0188	0.0226	0.0251	0.0267	0.0277	0.0284
Fixed Support a Side	β	0.4182	0.4646	0.486	0.4968	0.4971	0.4973	0.5
Sample Support b Side	α	0.021	0.0243	0.0262	0.0273	0.028	0.0283	0.0285
Fixed Support b Side	β	0.4182	0.5208	0.5988	0.654	0.6912	0.7146	0.75
Fixed Support a Side	α	0.021	0.0349	0.0502	0.0658	0.08	0.0922	0.0922
Simple Supports all 4 sides	β	0.2874	0.3762	0.0453	0.5172	0.5688	0.6102	0.75
	α	0.0444	0.0616	0.077	0.0906	0.1017	0.111	0.1421



Note: The Max. Stress should not exceed tensile strength of ACP skin, accordingly we have to judge the suitable size of the panel

We need to check Max. Panel Deflection as per the size and thickness

$$\textbf{Max Panel Deflection } y_{max} = (-\alpha * w * b^4)/(E_{ACP} * T_{AC}^3)$$

Where

w = wind load

b = smallest panel dimension

E_{ACP} = Flexural Elastic Modulus (N/mm^2)

T^3_{ACP} = Panel Thickness^3

α = to be calculated from above table of a/b ratio

Note: The Max. Deflection should not exceed b/60, accordingly we have to judge the suitable size of the panel

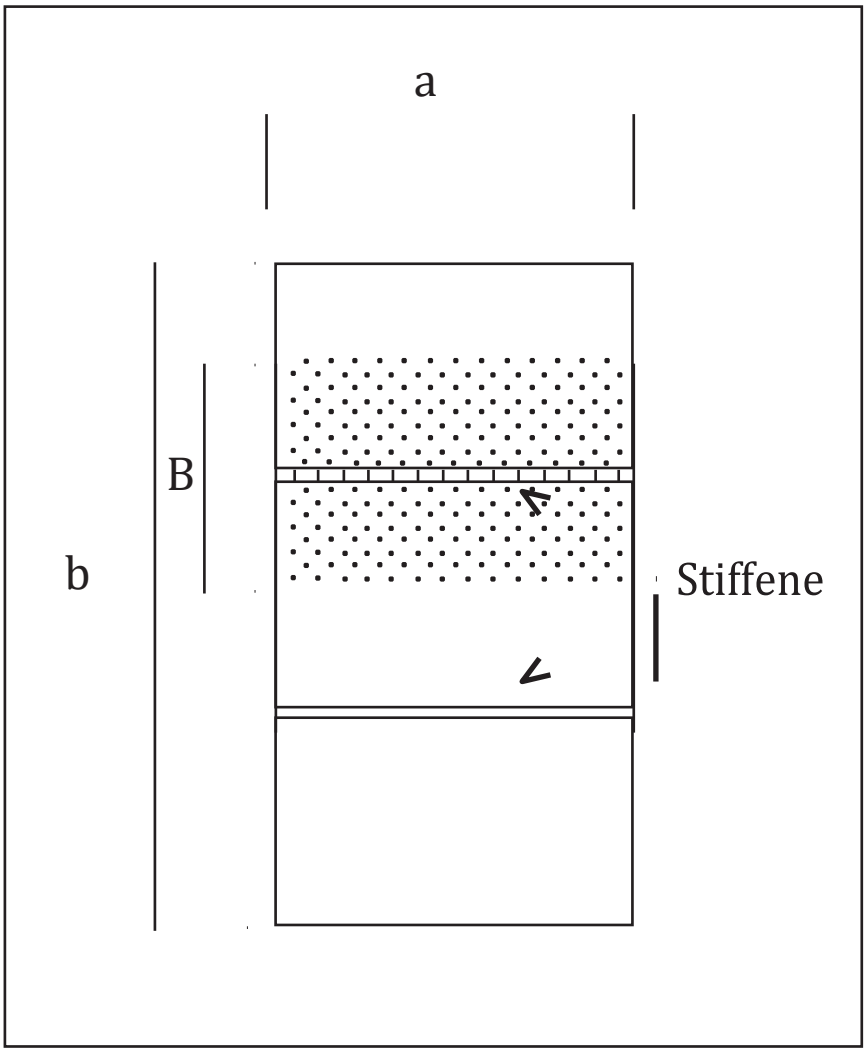
If both or one condition is not fulfilled than we need to add stiffeners or change the size of ACP Panel.

If we are adding stiffeners, then below calculations are to be checked so that we can understand the number of stiffeners to be used and after using them

1. Decrease in deflection and stress over panel
2. Stress and deflection over stiffener/s

For calculating the stress and deflection over panel and stiffeners below parameters are to be calculated

Now with stiffeners



Smaller Side will change to B which is

B=a/(no. of stiffeners)

And longer side will change to A

A=b

Now wind load will also change to W and

W=w*B

We will first calculate the bending moment M

$$M = W*B^2/8$$

We will now calculate moment of inertia of stiffener and ACP

Moment of Inertia of Stiffener

$$I_I = (gh^3-jk^3)/12$$

Where

g is the shorter side width/height of

stiffener h is the longer side width/height of

stiffener i is the thickness of stiffener

j= g-i

k= h-

i

Moment of Inertia of ACP

$$I_A = B*(T^3-\text{Core thickness}^3)/12$$

Now,

Bending Moment on Stiffener

$$M_s =$$

Bending Moment on ACP

$$(M*I_I)/(I_I+I_A)$$

Section Modulus of Stiffener

$$M_A=(M*IA)/(II$$

Section Modulus of ACP

$$+IA)$$

$$Z_1 = (gh^3-jk^3)/6h$$

$$Z_2 = B*(T^3-\text{Core thickness3})/(6*\text{Panel Thickness})$$

Stress on Stiffener

$$S_1 =$$

Stress on ACP

$$M_s/Z_1$$

$$S_2 =$$

$$M_A/Z_2$$

Stress on stiffener< Yield Strength of Stiffener

Stress on Panel < Tensile Strength of Aluminium Skin

For deflection on stiffener and panel following calculations are done Deflection on Stiffener

Deflection on ACP $D_S = (5W*A^4)/(384*Es*I_I)$

Combined Deflection $D_A = (-$

$\alpha*w*B^4)/(E_{ACP}*T^3)$ $D_C =$

$D_S*D_A / (D_S+D_A)$

Calculating Back Support System for ACP

Composite panels are installed on steel or aluminium constructions so they are affected by the same wind load as the construction that they are installed on. The stress that the construction material will be exposed to, depends on its rigidity, space between beams and force exerted by the wind load on the construction. The deflection made by the construction must be less than L/200 mm and it must not exceed the maximum allowed stress value.

Maximum

Stress $Z > W.L^2$

$/ 8.\sigma_{\%0.2}$

Deflection

$L/200 > 5.W.L^4 / I.E.384$

- Z: Cross-section Module of Bottom Construction (mm^3)
- W: Wind Load (N/mm)
- L: Support Interval (mm)
- $\sigma_{\%0.2}$: Yield Strength (N/mm^2)
- E: Elastic Module of Bottom Construction (N/mm^2)
- I: Moment of Inertia of Bottom Construction (mm^4)

From the above formulae we can calculate the intervals in which the particular size extrusion will work for the designated wind load.

Example for Design Calculation

Aluminium Composite Panel to be fixed with Rout and Return/ Tray Method

Material Specification:

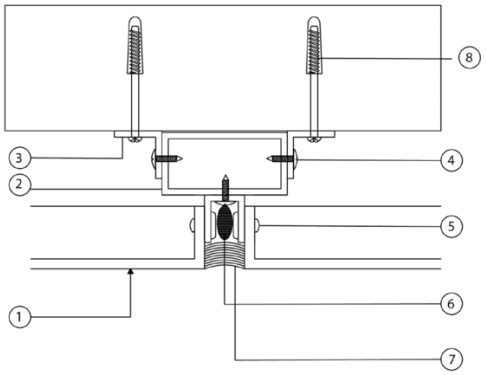
1.Aluminium Composite Panel: 4mm thick Aluminium Composite Panel with 0.5mm top and bottom aluminium skin of AA3105/AA5005 alloy grade and 3mm thick fire rated mineral core passing Class B S1 D0 of EN135501-1 grade. The top skin having PVDF/FEVE coating of two coat 25-28 microns or 30-35 microns 3 coat by Double Coat Double Bake Method. The weight of Panel would be minimum 7.5 Kg/ Sqm. Permissible Deflection is L/60

2. For Fixing ACP the Back Support Aluminium profile should be of AA6063/AA6065 grade aluminium alloy with powder coating of PVDF minimum 40 microns with 10 year warranty. Permissible Deflection to be considered is L/175

3. The ACP cladding shall be designed to sustain Wind Load of 3.6 KPa, 2.2 KPa and 1.5 KPa

4. Two Panel Sizes are considered 1170mm X 1170mm and 1170mm X 2390mm

Typical Fixing Details:



Detail

SL	DESIGNATION
1	Tray made from Aludecor ACP Sheet
2	Aluminium Tube
3	MS. Bracket
4	Screw
5	POP Rivet
6	Backer Rod
7	Silicone
8	Fastener

Stress and Deflection Calculation for Aluminium Composite Panel

1. Panel Size 1170mm X 1170mm

a) w: wind load: 3.6 KPa = 0.0036 N/mm²

Material Properties:

Tensile Strength Aluminium Skin: 150

N/mm² Elasticity Modulus ACP: 39800

N/mm²

b: smaller value of Length/Width:

1170mm a: higher value of Length/Width:

1170mm

T^2 = (Panel thickness³-Core Thickness³)/Panel thickness

= (4³-3³)/3= 9.25

mm² T^3= Panel

Thickness³

= 4³ = 64 mm³

b/a ratio: 1

This is a four sided fixed system

ß= 0.30784

α = 0.0138

Max. Allowable Stress: ß*w*b²/T²

: 164.01

N/mm² Max. Deflection: (-

α*w*b⁴)/(E*T³)

: 36.54 mm

The Max. Allowable stress 164.01 N/mm² is more than the Tensile Strength of Aluminium Skin 150 N/ mm² and the Max. Deflection 36.54mm is also more than permissible deflection of L/60 i.e. 19.5mm. So we will require stiffener.

b) w: wind load: 2.2 KPa = 0.0022 N/mm²

Material Properties:

Tensile Strength Aluminium Skin: 150

N/mm² Elasticity Modulus ACP: 39800

N/mm²

b: smaller value of Length/Width:

1170mm a: higher value of Length/Width:

1170mm

T² = (Panel thickness³-Core Thickness³)/Panel thickness

= (43-33)/3= 9.25 mm²

T3= Panel Thickness3

= 4³ = 64 mm3

b/a ratio: 1

This is a four sided fixed

system ß = 0.30784

α = 0.0138

Max. Allowable Stress: ß*w*b2/T²

: 100.22

N/mm² Max. Deflection: (-

α*w*b⁴)/(E*T³)

:22.33 mm

The Max. Allowable stress 100.22 N/mm² is less than the Tensile Strength of Aluminium Skin 150 N/ mm² but the Max. Deflection 22.33mm is more than permissible deflection of L/60 i.e. 19.5mm. So we will require stiffener.

c) w: wind load: 1.5 KPa = 0.0015 N/mm²

Material Properties:

Tensile Strength Aluminium Skin: 150 N/mm²

Technical

Elasticity Modulus ACP: 39800 N/mm²

b: smaller value of Length/Width:

1170mm a: higher value of Length/Width:

1170mm

T^2 = (Panel thickness³-Core Thickness3)/Panel thickness

= (4³-3³)/3= 9.25

mm² T^3= Panel

Thickness³

= 4³= 64 mm³

b/a ratio: 1

This is a four sided fixed

system ß = 0.30784

α = 0.0138

Max. Allowable Stress: ß*w*b²/T²

: 68.34 N/mm²

Max. Deflection: (-α*w*b⁴)/(E*T³)

: 15.23mm

The Max. Allowable stress 68.34 N/mm² is less than the Tensile Strength of Aluminium Skin 150 N/ mm² and the Max. Deflection 15.23mm is also less than permissible deflection of L/60 i.e. 19.5mm. So we will not require stiffener.

So, in the case of 3.6 KPa and 2.2 KPa we will require stiffeners and in 1.5 KPa we will not require stiffener.

Also, for panel size 1170mm X 2390mm we will require stiffeners for 3.6 KPa and 2.2 KPa as with the increase in size of Panel Max. Allowable Stress and Max. Deflection would further increase. So, we need to check for 1.5 KPa only that there is a requirement of stiffener or not.

2. Panel Size 1170mm X 2390mm

Material Properties:

Tensile Strength Aluminium Skin: 150

N/mm² Elasticity Modulus ACP E: 39800

N/mm²

b: smaller value of Length/Width:

1170mm a: higher value of Length/Width:

1170mm

T^2 = (Panel thickness³-Core Thickness³)/Panel thickness

= (4³-3³)/3= 9.25 mm²

T^3= Panel Thickness^3

= 4^3= 64

mm^3 b/a ratio:

1

This is a four sided fixed

system ß = 0.4974

α = 0.0277

Max. Allowable Stress: ß*w*b^2/T^2

: 110.41

N/mm^2 Max. Deflection: (-

α*w*b^4)/(E*T^3)

: 30.56 mm

The Max. Allowable stress 110.41 N/mm^2 is less than the Tensile Strength of Aluminium Skin 150 N/mm^2 but the Max. Deflection 30.56 mm is more than permissible deflection of L/60 i.e. 19.5mm. So we will require stiffener.

Stiffener Stress and Deflection Calculation

Note: Stiffener is provided along the shorter side to divide the longer side into small lengths. Do not use stiffeners along the longer side and further shorten the small side length.

1) Panel Size: 1170mm X

2390mm Wind Load: 3.6 KPa

No. of Stiffeners: 3

Material Properties:

Stiffener Size: 50mm X 25mm X 3mm

Tensile Strength of Stiffener: 150 N/mm^2

Elasticity Modulus of Stiffener Es: 70000 N/mm^2

Moment of Inertia Stiffener I1: 125542 mm^4

Section Modulus of Stiffener Z1= 5021.68 mm^3

B = a/(no. of stiffeners+1)

= 2390/(3+1) = 597.5 mm

W: Wind Load acting on B= w*B

= 2.151 N/mm

Bending Moment M = WB^2/8

= 95990.01 N/mm

Moment of Inertia ACP I2= B*(T^3-Core $thickness^3$)/12

= 1842.29

Stiffener share Ms= (M*I1)/(I1+I2)

= 94601.8

ACP share MA = (M*I2)/(I1+I2)

= 1388.25

Section Modulus of ACP Z2= B(T^3-Core thickness^3)/(6*Panel Thickness)

= 921.15

Stress on Stiffener = Ms/Z1

= 18.83 N/mm²

Stress on ACP = MA/Z2

= 1.5 N/mm²

Stress on Stiffener and ACP does not exceed the Tensile Strengths of both.

So now we will check the deflection

b/a ratio: 1.4

α = 0.0226

Deflection of ACP (D2) = $(-\alpha*w*B^4)/(E_{ACP}*T^3)$

= 4.99 mm

Deflection of Stiffener (D1) = $5W*a^4/(384*Es*I1)$

= 5.97 mm

Combined Deflection = $D1*D2/(D1+D_2)$

= 2.72 mm

2) Panel Size: 1170mm X

2390mm Wind Load: 2.2 KPa

No. of Stiffeners: 2

Material Properties:

Stiffener Size: 50mm X 25mm X 2mm

Tensile Strength of Stiffener: 150 N/mm²

Elasticity Modulus of Stiffener Es: 70000 N/mm²

Moment of Inertia Stiffener I1: 90078.67 mm⁴

Section Modulus of Stiffener Z1= 3603.15 mm³

B = a/(no. of stiffeners+1)

= 2390/(2+1) = 796.67 mm

W: Wind Load acting on B= w*B

= 1.752 N/mm

Bending Moment M = $WB^2/8$

= 139047.32 N/mm

Moment of Inertia ACP I2= B*(T^3-Core $thickness^3$)/12

= 2456.39

Stiffener share Ms= (M*I1)/(I1+I2)

= 135356.24

ACP share M_A = (M*I2)/(I1+I2)

= 3691.08

Section Modulus of ACP Z2= B(T3-Core thickness3)/(6*Panel Thickness)

= 1228.19

Stress on Stiffener = Ms/Z1

= 37.57 N/mm^2

Stress on ACP = M_A/Z2

= 3.01 N/mm^2

Stress on Stiffener and ACP does not exceed the Tensile Strengths of both.

So now we will check the deflection

b/a ratio: 1.4

α= 0.0226

Deflection of ACP (D2) = (-α*w*B4)/(E_{ACP}*T3)

= 7.86 mm

Deflection of Stiffener (D1) = $5W*a^4/(384*Es*I1)$

= 6.78 mm

Combined Deflection = D1*D2/(D1+D2)

= 3.64 mm

3) Panel Size: 1170mm X

2390mm Wind Load: 1.5 KPa

No. of Stiffeners: 2

Material Properties:

Stiffener Size: 50mm X 25mm X 2mm

Tensile Strength of Stiffener: 150 N/mm²

Elasticity Modulus of Stiffener Es: 70000 N/mm²

Moment of Inertia Stiffener I1: 90078.67 mm⁴

Section Modulus of Stiffener Z1= 3603.15 mm³

B = a/(no. of stiffeners+1)

= 2390/(2+1) = 796.67 mm

W: Wind Load acting on B= w*B

= 1.752 N/mm

Bending Moment M = WB²/8

= 139047.32 N/mm

Moment of Inertia ACP I2= B*(T3-Core thickness3)/12

= 2456.39

Stiffener share Ms= (M*I1)/(I1+I2)

= 135356.24

ACP share M_A = (M*I2)/(I1+I2)

= 3691.08

Section Modulus of ACP Z2= B(T³-Core thickness3)/(6*Panel Thickness)

= 1228.19

Stress on Stiffener = Ms/Z1

= 37.57

N/mm² Stress on ACP = M_A/Z2

= 3.01 N/mm²

Stress on Stiffener and ACP does not exceed the Tensile Strengths of both.

So now we will check the deflection

b/a ratio: 1.4

α = 0.0226

Deflection of ACP (D2) = $(-\alpha * w * B^4)/(E_{ACP} * T^3)$

= 5.36 mm

Deflection of Stiffener (D1) = $5W*a4/(384*E_s*I1)$

= 4.62 mm

Combined Deflection = D1*D2/(D1+D2)

= 2.48 mm

4) Panel Size: 1170mm X

1170mm Wind Load: 3.6 KPa

No. of Stiffeners: 1

Material Properties:

Stiffener Size: 50mm X 25mm X 2mm

Tensile Strength of Stiffener: 150 N/mm²

Elasticity Modulus of Stiffener Es: 70000 N/mm²

Moment of Inertia Stiffener I1: 90078.67 mm⁴

Section Modulus of Stiffener Z1= 3603.15 mm³

B = a/(no. of stiffeners+1)

= 2390/(2+1) = 796.67 mm

W: Wind Load acting on B= w*B

= 1.752 N/mm

Bending Moment M = WB²/8

= 139047.32 N/mm

Moment of Inertia ACP I2= B*(T3-Core thickness³)/12

= 2456.39

Stiffener share Ms= (M*I1)/(I1+I2)

= 135356.24

ACP share M_A = (M*I2)/(I1+I2)

= 3691.08

Section Modulus of ACP Z2= B(T³-Core thickness³)/(6*Panel Thickness)

= 1228.19

Stress on Stiffener = Ms/Z1

= 37.57 N/mm²

Stress on ACP = M_A/Z2

= 3.01 N/mm²

Stress on Stiffener and ACP does not exceed the Tensile Strengths of both. So now we will check the deflection

b/a ratio: 1.4

α = 0.0226

Deflection of ACP (D2) = $(-\alpha * w * B^4)/(E_{ACP} * T^3)$

= 5.36 mm

Deflection of Stiffener (D1) = $5W * a^4/(384 * Es * I1)$

= 4.62 mm

Combined Deflection = D1*D2/(D1+D2)

= 2.48 mm

As 1 stiffener is enough for wind load 3.6 KPa so, it will be good for 2.2 KPa also.

Back Support Aluminium Profile Stress and Deflection Calculation

1. Panel Size: 1170mm X 2390mm Wind Load w = 3.6 KPa = 0.0036N/mm²

Aluminium Profile Size 50mm X 25mm X 3mm Elasticity Modulus E: 70000 N/mm²

Tensile Strength Y: 150 N/mm²

Moment of Inertia I: 125542 mm⁴ Section Modulus Z: 5021.68 mm³

W= wX1220 = 0.0036X 2390

= 8.6 N/mm

$Z > WL^2/8Y$

5021.68 > 8.6 X L2/8 X 150

L < 837 mm

L/175 > 5WL4/384 E I

L/175 > 5 X 8.6 X L4/384 X 70000 X 125542 L < 765 mm

So, we should have brackets at every 765 mm

2. Panel Size: 1170mm X 2390 mm Wind Load 2.2 KPa
Aluminium Profile Size 50mm X 25mm X 2mm Elasticity Modulus E: 70000 N/mm²
Tensile Strength Y: 150 N/mm²
Moment of Inertia I: 90078.67 mm⁴
Section Modulus Z: 3603.15 mm³

W= wX1220 = 0.0022X 2390
= 5.26 N/mm
Z > WL2/8Y
3603.15 > 5.26 X L2/8 X 150
L < 906 mm

L/175 > 5WL4/384 E I
L/175 > 5 X 5.26 X L4/384 X 70000 X 90078.67
L < 807mm
So, we should have brackets at every 807 mm

3. Panel Size: 1170mm X 2390 mm Wind Load 1.5 KPa
Aluminium Profile Size 50mm X 25mm X 2mm Elasticity Modulus E: 70000 N/mm²
Tensile Strength Y: 150 N/mm²
Moment of Inertia I: 90078.67 mm⁴
Section Modulus Z: 3603.15 mm³

W= wX1220 = 0.0015X 2390
= 3.59 N/mm
Z > WL2/8Y
3603.15 > 3.59 X L2/8 X 150

L < 1098 mm

L/175 > 5WL4/384 E I

L/175 > 5 X 3.59 X L4/384 X 70000 X

90078.67 L < 917 mm

So, we should have brackets at every 917 mm

4. Panel Size: 1170mm X

1170mm Wind Load w = 3.6 KPa =

0.0036N/mm2

Aluminium Profile Size 50mm X 25mm X

3mm Elasticity Modulus E: 70000 N/mm²

Tensile Strength Y: 150 N/mm²

Moment of Inertia I: 125542

mm⁴ Section Modulus Z: 5021.68

mm³

W= wX1220 = 0.0036X 1170

= 4.21 N/mm

Z > WL2/8Y

5021.68 > 4.21 X L2/8 X 150

L < 1196 mm

L/175 > 5WL4/384 E I

L/175 > 5 X 4.21 X L4/384 X 70000 X

125542 L < 971 mm

So we should provide bracket at every 971mm

5. Panel Size: 1170mm X 1170

mm Wind Load 2.2 KPa

Aluminium Profile Size 50mm X 25mm X

2mm Elasticity Modulus E: 70000 N/mm²

Tensile Strength Y: 150 N/mm²

Moment of Inertia I: 90078.67 mm⁴

Section Modulus Z: 3603.15 mm³

W= wX1220 = 0.0022X 1170

= 2.57 N/mm

Z > WL2/8Y

3603.15 > 2.57 X L2/8 X 150

L < 1296 mm

L/175 > 5WL4/384 E I

L/175 > 5 X 2.57 X L4/384 X 70000 X

90078.67 L < 1024 mm

So, we should have brackets at every 1024 mm

6. Panel Size: 1170mm X 1170

mm Wind Load 1.5 KPa

Aluminium Profile Size 50mm X 25mm X

2mm Elasticity Modulus E: 70000 N/mm²

Tensile Strength Y: 150 N/mm²

Moment of Inertia I: 90078.67 mm⁴

Section Modulus Z: 3603.15 mm³

W= wX1220 = 0.0015X 1170

= 1.76

N/mm Z >

WL2/8Y

3603.15 > 2.57 X L2/8 X 150

L < 1569 mm

L/175 > 5WL4/384 E I

L/175 > 5 X 2.57 X L4/384 X 70000 X

90078.67 L < 1123 mm

So, we should have brackets at every 1123 mm

Chapter 7

Fabrication Guidance

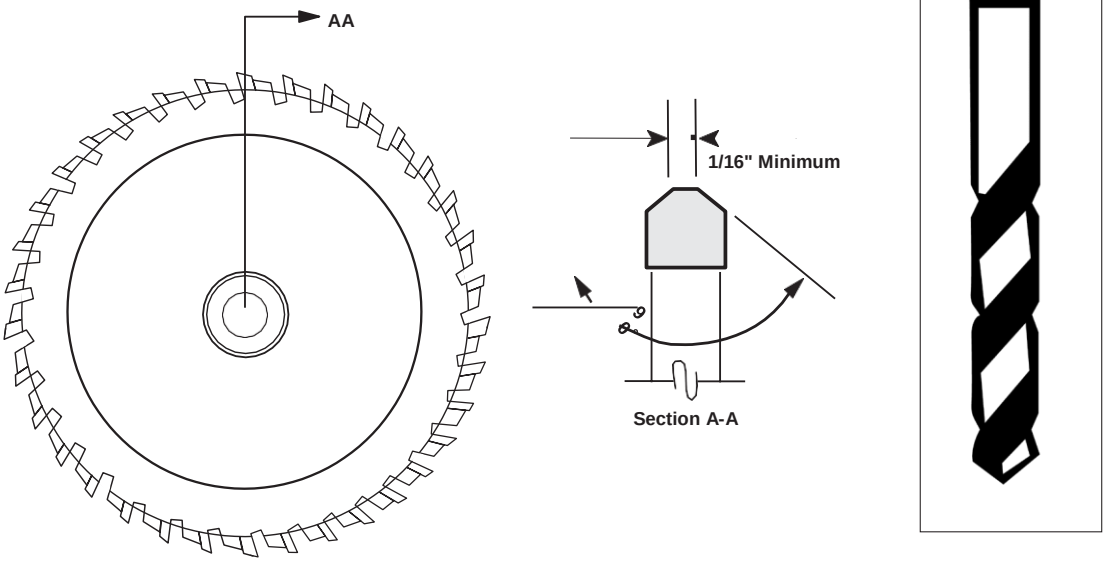
Installation is one of the major criteria for durability of the system as a whole.
Main check lists for the installation of Metal Composite Panels are as below:

1.Cutting of ACP:

Tools required:

- CNC Machine
- Hand Router

FIGURE 3 - ROUTING SAW BLADE ("V" ROUTING BLADE)

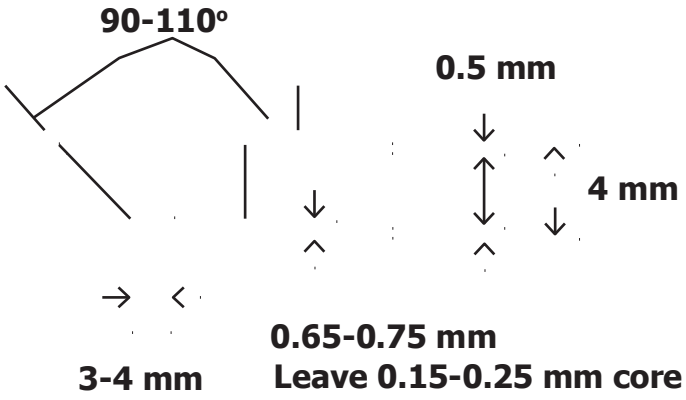


CNC Bit

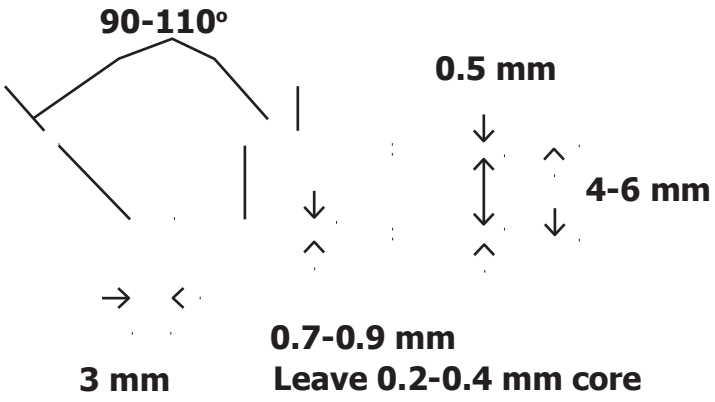
Hand Router: The blade should be 10mm to 12mm thick.

2. Routing of ACP

- For 90-degree fold we need to have 90 degrees to 100-degree blade angle of 10mm to 12mm thick
- We need to leave 0.2mm-0.4mm core after routing for Normal ACP and for FR ACP we need to have 0.15- 0.2mm core.



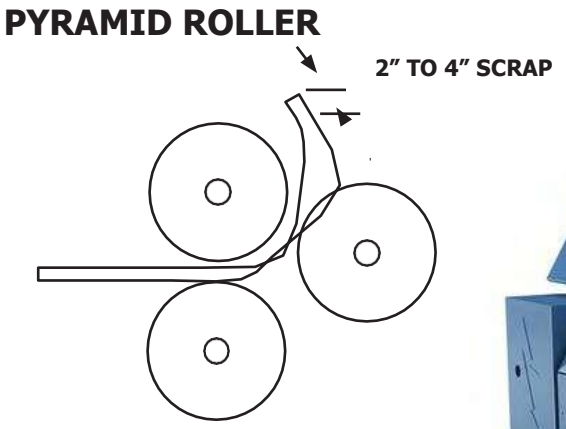
FR ACP



Normal ACP

3. Rolling of ACP:

It should always be done by 3 roller bending machine. The radius of Normal ACP should be not less than 15 times the thickness of sheet. The radius for Class B should be between 305 – 381 mm and for Class A2 should not be less than 600mm.



3 rollbending

4. Weather Silicon Sealant:

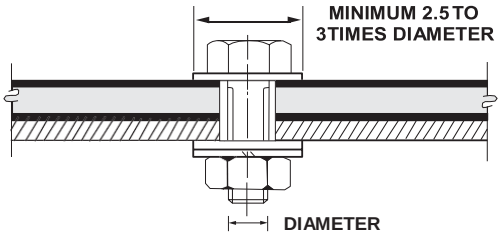
Aludecor recommends only non-bleeding weather silicon sealant with at least 10 year warranty to be used.

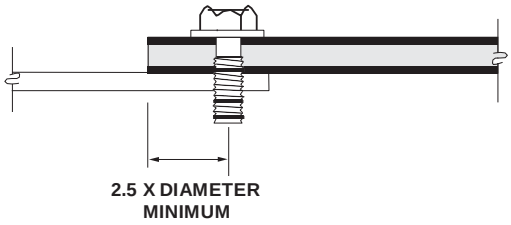
5. Strength of Connections:

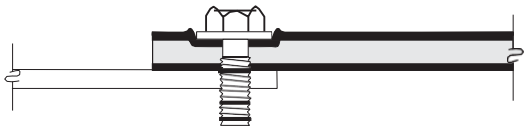
The ACP would be connected to Aluminium Profile by nut- bolt, rivet and screw. This would cause stress on connections which should be within elasticity limits. The nut-bolt, rivet or screw should be having endurance to corrosion.

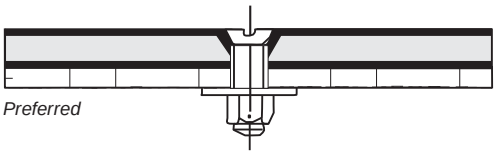
The distance between edge and hole should be twice the diameter.

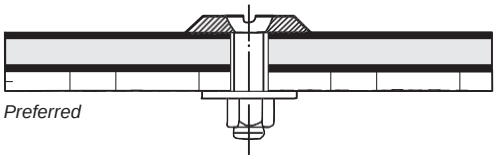
The rivet as a connector should be chosen in accordance to panel pressure otherwise it would snap under strong wind load. Hole diameter should be 0.2 mm bigger than the rivet diameter.

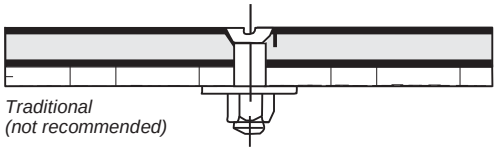






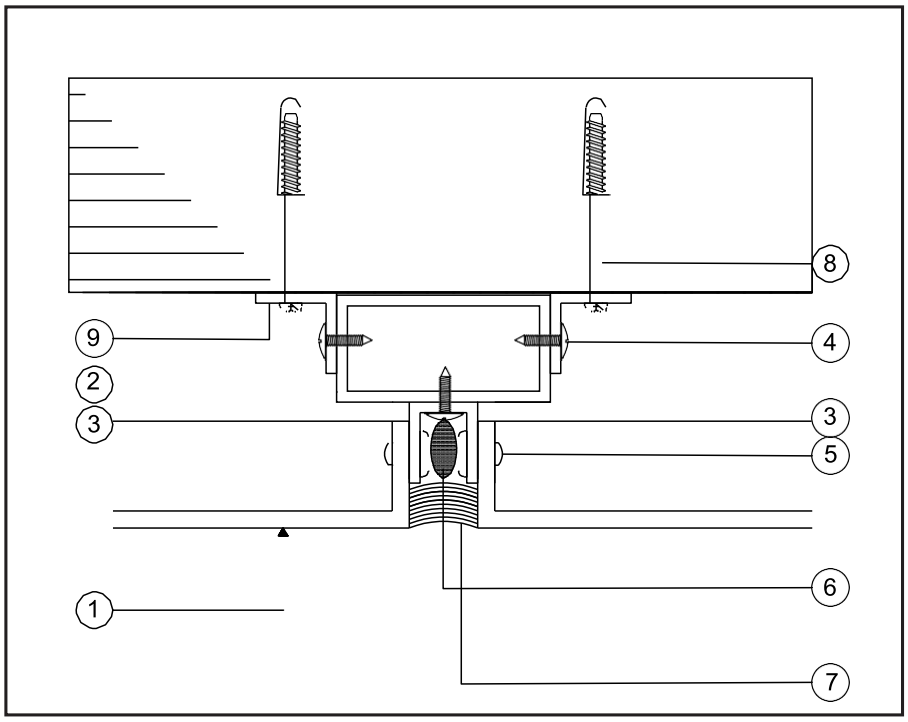






Hole Diameter (mm)	Distance from center of hole to edge (mm)	Maximum Elastic Stress (N/mm^2)	Maximum Stress Force (N)
5	5	21	320
	10	48	720
	15	55	820
10	9	20	590
	19	38	1150
	30	49	1170

6. Typical connection detail of Rout & return; And Ventilated Facade

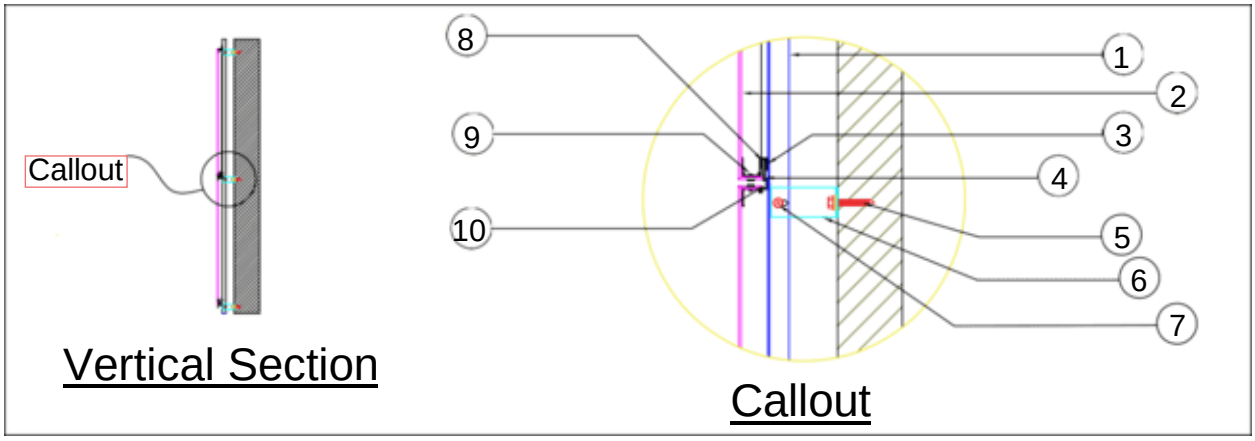


Details

SL.	Designation
1	Tray Made from 4mm Aluminium Composite Panel
2	Aluminium Tube
3	Aluminium Cleat
4	Screw
5	POP Rivet
6	Backer Rod
7	Silicone
8	Fastener
9	Bracket

Rout and Return

Technical



Vertical Section

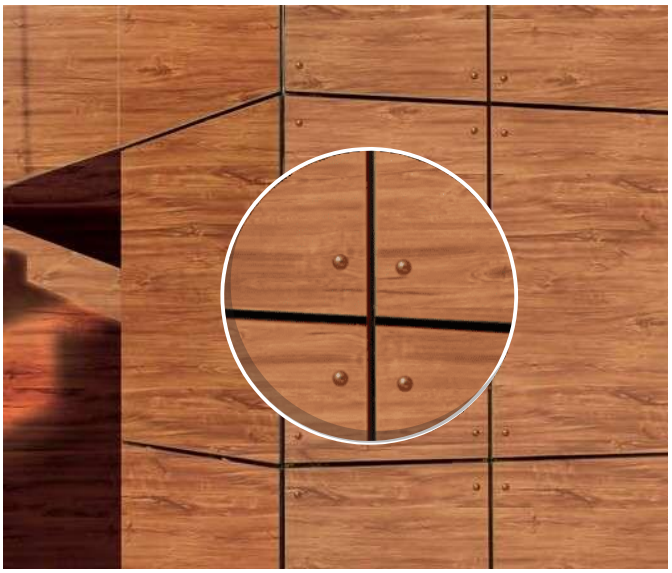
Callout

Details

SL.	Designation
1	Aluminium Profile - ALPL/P/211(Omega Profile)
2	Tray made from Aludecor 4mm Aluminium composite panel
3	Aluminium Profile - ALPL/P/311 - Male Profile
4	Aluminium Profile - ALPL/P/312 - Female Profile
5	Anchor Fastener HRD-HR2 10X100
6	Double T Bracket - ALPL/P/210A
7	Anchor Bolt
8	Neoprene Gasket every 500 mm max
9	POP Rivet
10	Screw

Horizontal Section

Ventilated Facade

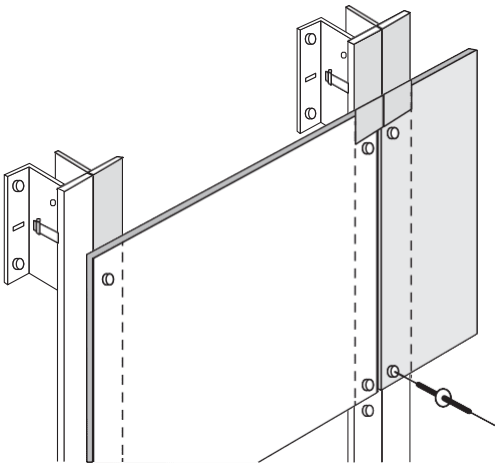


7. Rivets

The riveted assembly system is versatile as it adapts perfectly to any architectonic typology. It is a visible fixing system that can be assembled rapidly. It admits as many horizontal pieces as vertical. Furthermore, by using panels that have not been shaped, it offers the possibility of executing curved areas. For all of this, them riveted system complies with the requisites to execute the most demanding architectonic claddings. All of the substructures are made with 6063 T6 aluminium alloy profiles. The substructures are made with double-T fixing brackets.

Technical

INSTALLATION TECHNIQUES OF ACP

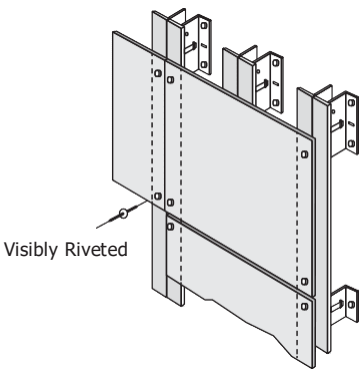


METHOD OF RIVETING

The riveted assembly system is a versatile system as it adapts perfectly to any architectonic typology. It is
a seen fixing system that can be assembled rapidly. It admits as many horizontal pieces as vertical.

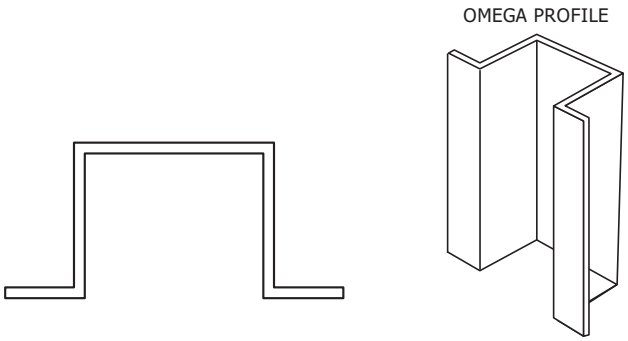
Furthermore, by using panels that have not been shaped, it offers the possibility of executing curved areas. For all of this, the riveted system complies with the requisites in order to execute the most demanding architectonic claddings.

All of the substructure is made with 6063

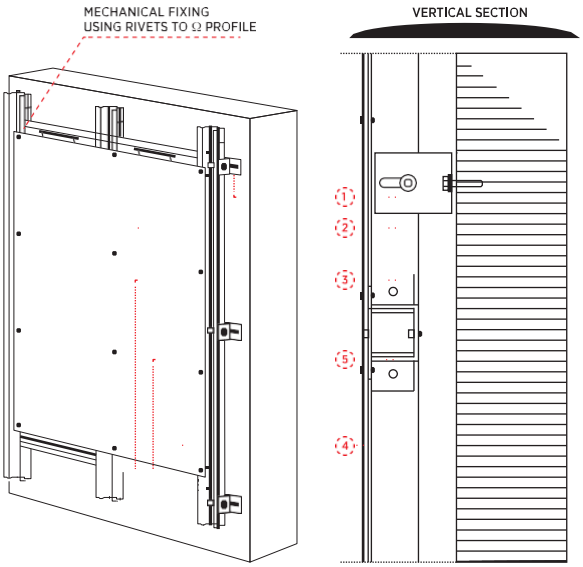


Visibly Riveted

AUXILIARY ELEMENTS FOR THE RIVETED SYSTEM



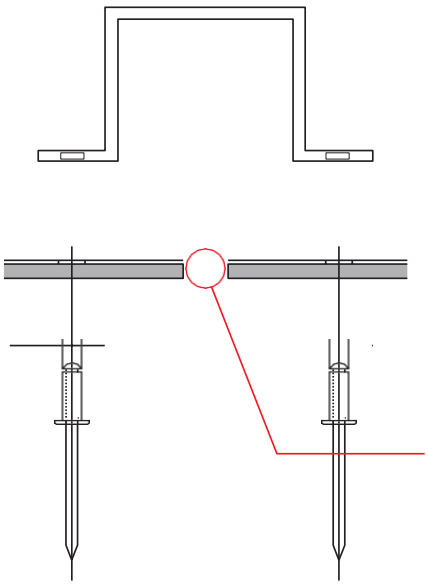
ASSEMBLY DIAGRAM SYSTEM RIVETED

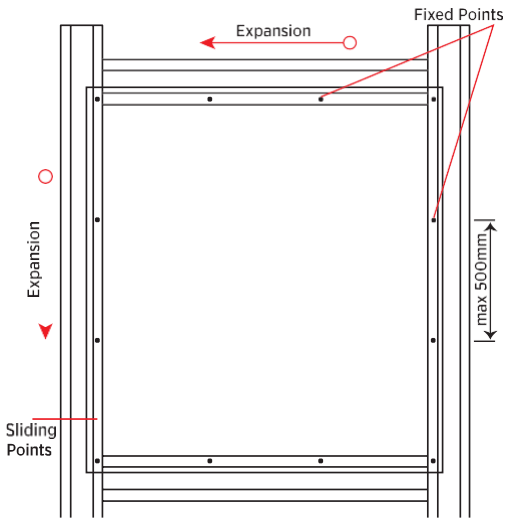


Serial	Designation
1	Double T profile bracket
2	Omega mullion profile
3	Joining profile between omegas
4	Aludecor composite panel
5	Omega transom profile
6	Blind rivet

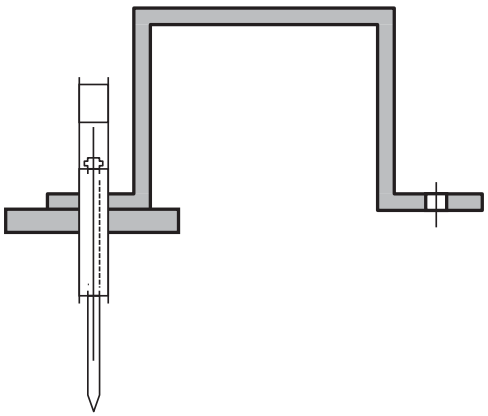
RIVET SYSTEM

SECTION

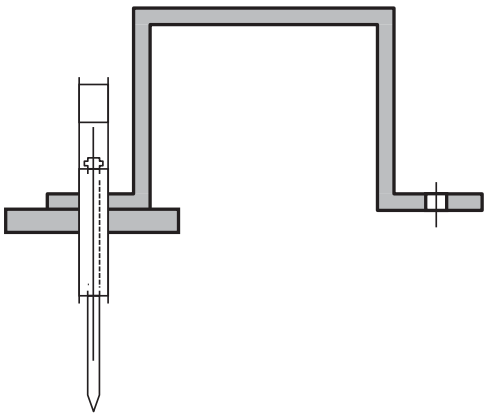




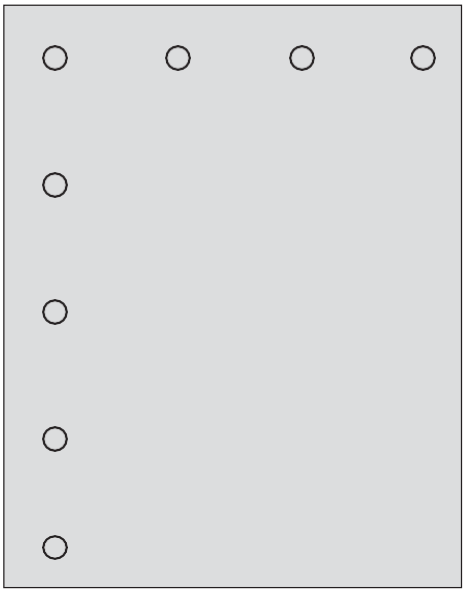
SLIDING POINTS SECTION



FIXED POINTS SECTION



Technical



In the drawing, the perforation diameters are demonstrated and the maximum distance to where these have to be situated. The panels are installed at the site after being perforated. They are fitted with the corresponding rivets. It must be done with attention to the play between the screw's diameter and the rivet pin as well as the distance between rivet and the panel edges. We recommend using a guide in order to position the rivets. Special attention must be paid to the direction indicated by an arrow on the film-protector to guarantee that different tones are not produced when the sun shines on the facade.

Aludecor rivets are ideal to be paired with Aludecor's 6mm Ace Series ACPs. Made heavier and longer for extra strength, these rivets are easily concealed with the ACP sheets as it is available in four different colours- RAL 8007- Fawn Brown, RAL 8003-Clay Brown, RAL 8014-Sepia Brown and RAL 7006-Beige Grey. Our rivet box contains 40 rivets.

8. Perforation

Perforated panels have a pattern of holes at regular intervals. This provides

ventilation and permits vision through the panel, making it suitable for balconies,

staircases, partitions and ceiling.

1.Perforation process

We normally use a turret puncher for perforation of composite panels.

Suitable clearance between punch and die is 0.1 mm or smaller (material thickness x 2 %). A small droop will appear at the punched edge.

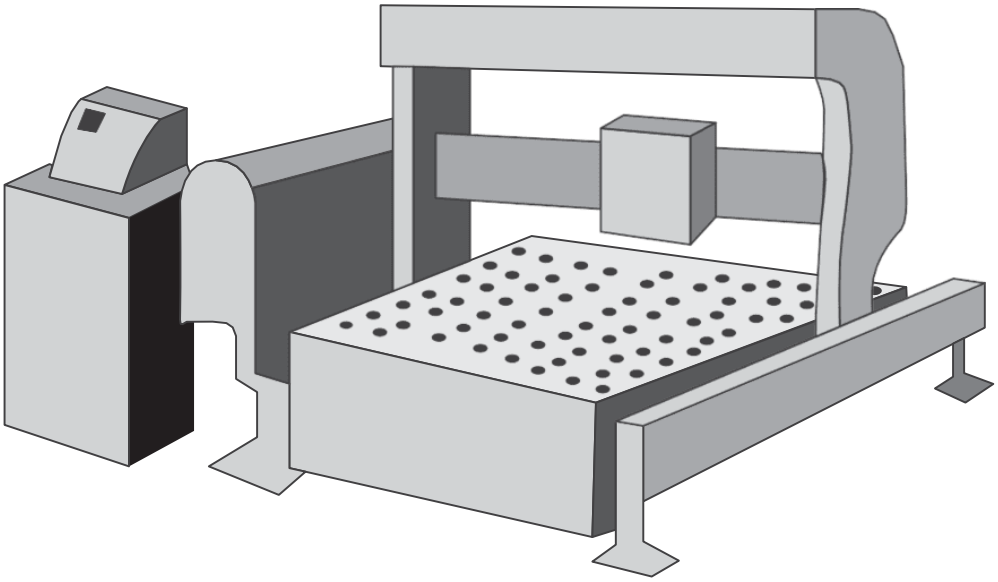
2. Example of perforation pattern

In the image on the next page it is shown a typical hole-arrangement of circle-shaped holes.

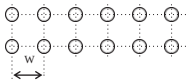
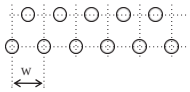
3. Panel strength

Panel strength is lessened after perforation. Namely, the permissible load of panels become smaller dependent on the perforation ratio (perforated area per total area).

Typical Hole-Arrangement of Circle-Shaped Holes



Technical

Direction	Pattern	Hole diameter	Interval (W)	Perforation ratio
Square		20 mm	40 mm	19.6%
60° Zigzag		5 mm	10 mm	22.6 %
		6 mm	10 mm	32.6 %
		7 mm	10 mm	44.4 %
		7 mm	10 mm	30.8 %
		8 mm	10 mm	40.2 %
		8 mm	10 mm	22.6 %
		10 mm	10 mm	40.2 %
		15 mm	10 mm	32.6 %

Note: Perforation ratio is % of the total area that is perforated.

Chapter 8

Aludecor Systems

Explore Aludecor Systems

What is The System?

Aludecor Systems, a framework and accessories set-up, is here to stay. Literally. This ensures far lower or even zero maintenance of the facade. No silicone in the grooves prevents stains and leaks. The system also saves energy by providing thermal insulation, beyond adding to the aesthetics of any structure.

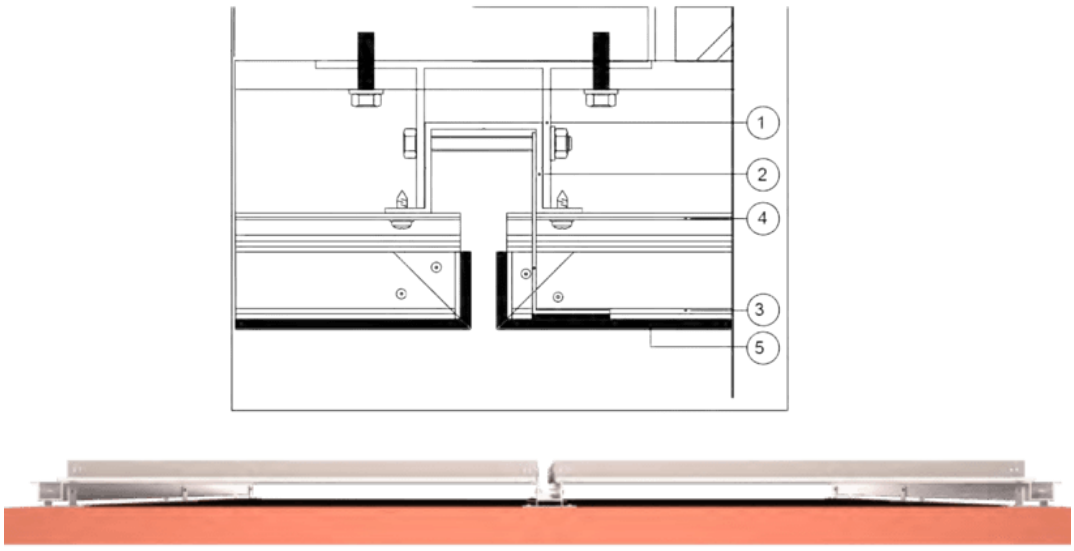
Aludecor Male Female Rainscreen System

The Aludecor Male Female Rainscreen System (MFR) for assembling the composite panels on ventilated facades comprises Male and Female 6063-T5 aluminium alloy profiles. The system has two profiles over which the shaped trays are fixed.

It is a concealed fixing system that is versatile and can be assembled quickly. Furthermore it has been studied especially in order to develop ventilated facades for Aludecor's composite panels with horizontal adjustment.

The substructure is made entirely of 6063-T5 aluminium profiles. It comprises fixings in a double T-shape with different lengths in order to absorb all irregularities of the facade. In order to avoid vibrations in the Aludecor panels, the male/female profiles have the neoprene protection gasket.

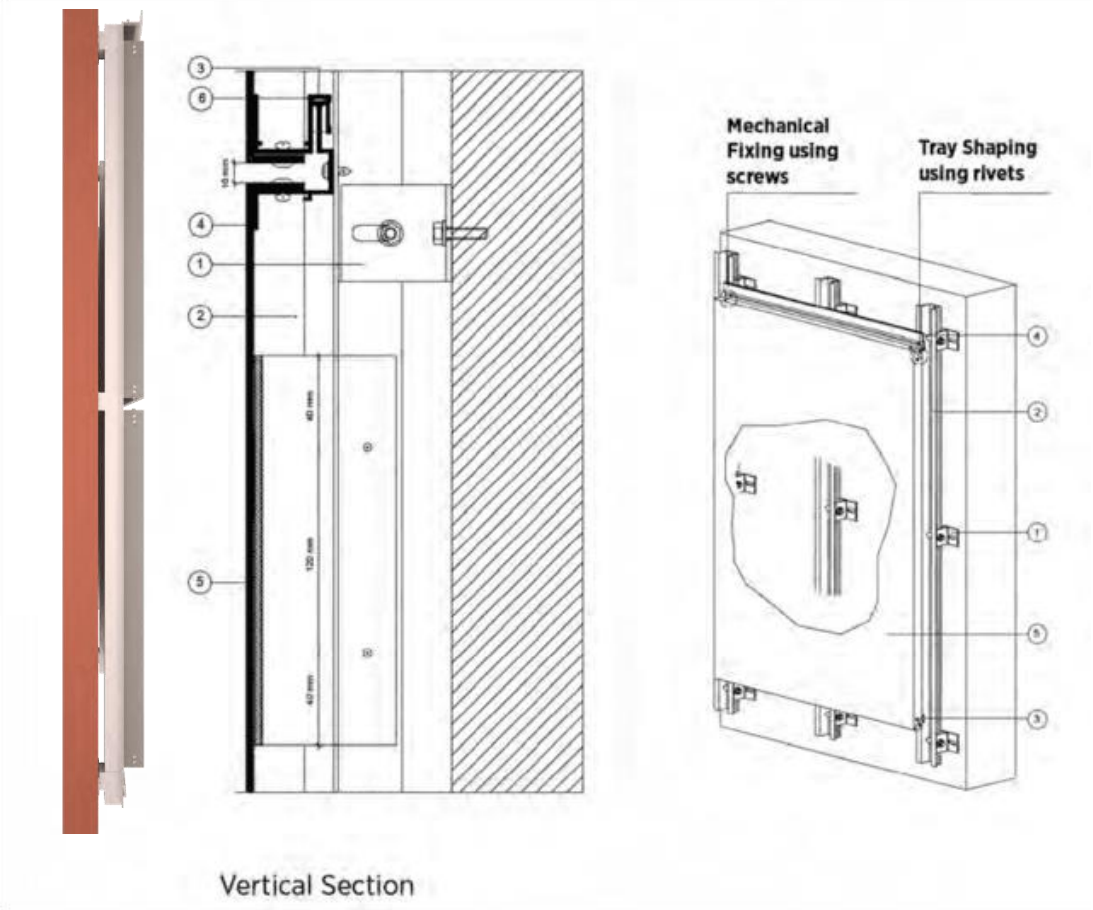
The spacer is fixed to the vertical parameter using special mechanical wedges that are recommended in each case by the fixing suppliers. These double T spacers receive the omega shaped vertical mullions. The trays are fixed to the vertical mullions using extruded profiles made from aluminium alloy 6063-T5.



Horizontal Section

SL	Designation
1	Double T Profile Bracket - ALPL/P/210
2	Aluminium Profile - ALPL/P/211
3	Aluminium Profile - ALPL/P/311
4	Aluminium Profile - ALPL/P/312
5	Tray made from Aludecor Aluminium Composite Panel
6	Neoprene gasket every 500 mm max

Technical



Vertical Section

Male Female

- It comprises with Male and Female Aluminium Profile.
- It is a concealed fixing mechanism that is versatile and can be assembled quickly.
- It has been developed especially in order to construct ventilated facades for Aludecor's composite panels with horizontal adjustment
- The trays are fixed to the vertical mullions using extruded profiles made from aluminium alloy.
- Neoprene gasket is used to control vibrations in panel.

Advantages of

- Great Strength
- Cost Savings
- Quickest Installation
- Durability
- Almost zero maintenance
- Enhanced Aesthetics

Chapter 9

Cleaning, Maintenance and Product Handling of Aluminium Composite Panels

ACP Cleaning and Maintenance Guide

Cleaning is an important step to prolong the shelf life of Aludecor's premium range of ACPs. Regular cleaning also makes sure that the sheer aesthetics of Aludecor's ACPs remain intact.

Frequency of Cleaning ACP Sheets

The frequency of cleaning thoroughly depends on the soiling rate and environmental condition of the application area. The frequency of cleaning is specified below:

Building Location	Frequency of Cleaning
Heavily Industrialized Area	2 times per year
Low Rainfall or Coastal Area	Once a year
Urban Area	Once a year
Rural Area	Once per two years

Procedure of Cleaning ACP Sheets

To clean Aludecor ACPs, all you need to do is follow simple steps, which are as below:

1. Try to clean the accumulated dirt with clear water.
2. If the dirt remains, use a soft cloth with diluted solution of mild soap and clean water to wipe the dirt away. Use clear water again to reveal a clean surface.
3. If the mild soap and clear water solution fail to clean the surface, then use isopropyl solution to clean the ACP sheets.

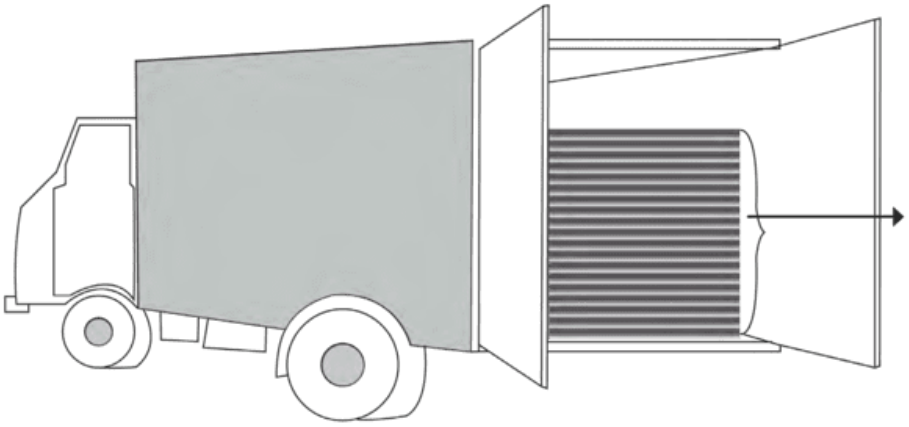
Points to Keep in Mind While Cleaning ACP Sheets

1. To get the optimum results, ACP sheets must be cleaned by keeping in mind, the precautions that are mentioned below:
2. Aludecor ACPs must never be cleaned in extreme hot or cold temperatures. If the ACP sheets are cleaned in freezing temperature, then the clear water or diluted mild soap solution will freeze on the surface of the ACP. On the other hand, if the ACP sheets are cleaned in hot temperatures, then it would dry the surface quickly, thus leaving soap/dirt marks.
3. MEK or Methyl Ethyl Ketone, Acid based detergents, paint solution based detergents or bleach based detergents must never be used to clean ACP sheets.
4. Always use mild Alkaline solution to clean ACP surfaces and avoid using scouring agents and abrasive substances.

Product Handling of Aluminium Composite Panels

Product Handling Guide

1. Check the quantity, carried by the vehicle/ transporter at the time of receiving the ACP sheets to tally with order/requirement
2. Check the quantity with the documents, which come along with the consignment. The main relevant documents are transporter's lorry receipt, and Aludecor's invoice challan copies

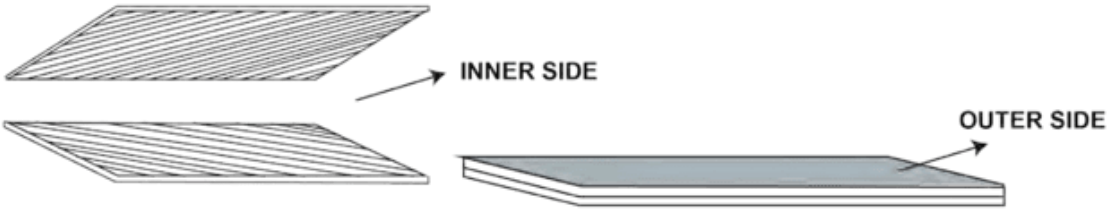


3. Before signing the lorry receipt copy, check the sheets properly. Sign the lorry receipt with appropriate comments, if any sheet/sheets are found:

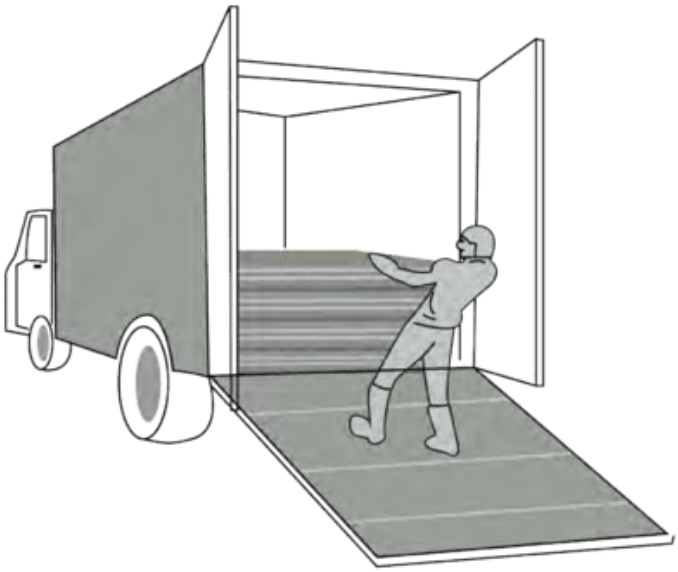
- Totally/partially damaged
- In short quantity

4. If any sheet is received in the aforesaid condition, then immediately let it be known to the concerned officials (zonal sales co-ordinator/ sales executives) of the company

- Check and verify all the documents received from the transporter

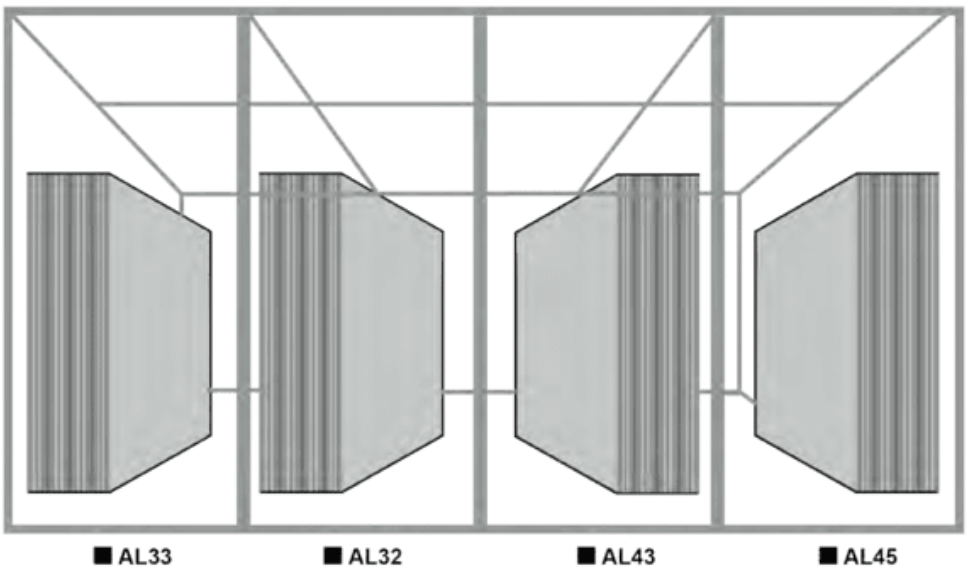


5. At the time of loading /unloading:
- Place the ACP sheets on a plain surface. A rough surface may cause a dent on them
- Do not pull/push or drag sheets from the vehicle
- Lift sheets in small units from both ends
- Always use hand gloves and safety shoes

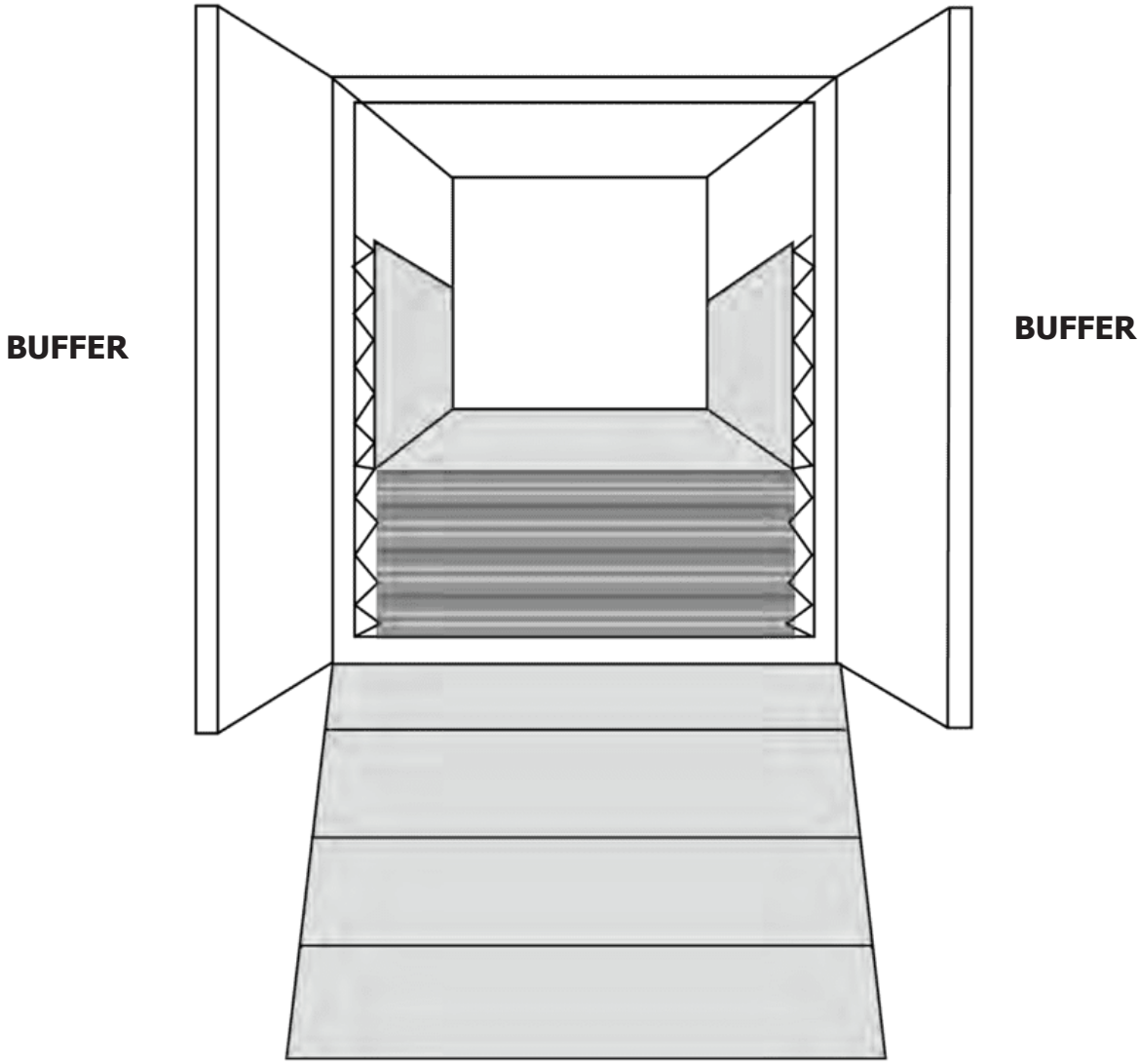


6. Do the segregation and classification of materials according to the codes written on the back of the sheets. For example, check the reverse side of ACP to find the product code/ number.

7. The racks containing the ACP sheets should have proper labels, specifying which rack contains which product.



8. The stack of sheets should be buffered on either side with ply or hard boards / wooden buffers so that the sheets stay fixed during transit. This exercise will ensure that no damage or dent is caused to the sheets.



9. Kindly preserve invoice of the company and all other documents received from the transporter. It will benefit both parties in case of future correspondence pertaining to any consignment related problem.

10. The ACP sheets should be kept in a cool and dry place above the ground and away from sun rays. If ACP sheets are exposed to sun rays for extended periods of time, then there remains a chance of glue transfer from the Protective Film of the ACP to the surface of the ACP sheet.

11. The ACP sheets should only be worked upon a table and the table must be levelled. Aludecor ACP sheets should never be worked upon the ground as it may cause scratches and dents.

12. Aludecor ACPs must not be cut by shearing.

AludecoR
Metal Composite Panel

Stacking of ACP Sheets at Aludecor Factory in Haridwar

Annexure 1

EN 573 & EN 485

Table 1 Aluminium Series 1000

Description		Si	Fe	Cu	Mn	Mg	Cr	
Numerical	Chemical Symbol							
EN AW-1050A	EN AW-Al 99,5	0,25	0,40	0,05	0,05	0,05	—	
EN AW-1060	EN AW-Al 99,6	0,25	0,35	0,05	0,03	0,03	—	
EN AW-1070A	EN AW-Al 99,7	0,20	0,25	0,03	0,03	0,03	—	
EN AW-1080A	EN AW-Al 99,8(A)	0,15	0,15	0,03	0,02	0,02	—	
EN AW-1085	EN AW-Al 99,85	0,10	0,12	0,03	0,02	0,02	—	
EN AW-1090	EN AW-Al 99,90	0,07	0,07	0,02	0,01	0,01	—	
EN AW-1098	EN AW-Al 99,98	0,010	0,006	0,003	—	—	—	
EN AW-1100	EN AW-Al 99,0Cu	0,95 Si + Fe		0,05 – 0,20	0,05	—	—	
EN AW-1110	EN AW-Al 99,1	0,30	0,8	0,04	0,01	0,25	0,01	
EN AW-1198	EN AW-Al 99,98(A)	0,010	0,006	0,006	0,006	—	—	
EN AW-1199	EN AW-Al 99,99	0,006	0,006	0,006	0,002	0,006	—	
EN AW-1200	EN AW-Al 99,0	1,00 Si + Fe		0,05	0,05	—	—	
EN AW-1200A	EN AW-Al 99,0(A)	1,00 Si + Fe		0,10	0,30	0,30	0,10	
EN AW-1235	EN AW-Al 99,35	0,65 Si + Fe		0,05	0,05	0,05	—	
EN AW-1350	EN AW-Al 99,5	0,10	0,40	0,05	0,01	—	0,01	
EN AW-1350A	EN AW-Al 99,5(A)	0,25	0,40	0,02	—	0,05	—	
EN AW-1370	EN AW-Al 99,7	0,10	0,25	0,02	0,01	0,02	0,01	
EN AW-1450	EN AW-Al 99,5Ti	0,25	0,40	0,05	0,05	0,05	—	

Table 1 Aluminium Series 1000

	Ni	Zn	Ti	Ga	V	Remarks	Other Impurities Individual	Tota l	A l u - mini- um min.
	—	0,07	0,05	—	—	—	0,03	—	99,50[c]
	—	0,05	0,03	—	0,05	—	0,03	—	99,60[c]
	—	0,07	0,03	—	—	—	0,03	—	99,70[c]
	—	0,06	0,02	0,03	—	e	0,02	—	99,80[c]
	—	0,03	0,02	0,03	0,05	—	0,01	—	99,85[c]
	—	0,03	0,01	0,03	0,05	—	0,01	—	99,90[c]
	—	0,015	0,003	—	—	—	0,003	—	99,98[d]
	—	0,10	—	—	—	e	0,05	0,15	99,00[c]
	—	—	—	—	—	0,02 B; 0,03 V + Ti	0,03	0,15	99,10[c]
	—	0,010	0,006	0,006	—	—	0,003	—	99,98[d]
	—	0,006	0,002	0,005	0,005	—	0,002	—	99,99[d]
	—	0,10	0,05	—	—	e	0,05	0,15	99,00[c]
	—	0,10	—	—	—	—	0,05	0,15	99,00[c]
	—	0,10	0,06	—	0,05	—	0,03	—	99,35[c]
	—	0,05	—	0,03	—	0,05 B; 0,02 V + Ti	0,03	0,10	99,50[c]
	—	0,05	—	—	—	0,03 Cr + Mn + Ti + V	0,03	—	99,50[c]
	—	0,04	—	0,03	—	0,02 B; 0,02 V + Ti	0,02	0,10	99,70[c]
	—	0,07	0,10-0,20	—	—	e	0,03	—	99,50[c]

Table 2 Aluminium Series 3000

Description		Si	Fe	Cu	Mn	Mg	Cr	
Numerical	Chemical Symbol							
EN AW-3002	EN AW-Al Mn0,2Mg0,1	0,08	0,10	0,15	0,05-0,25	0,05-0,20	—	
EN AW-3003	EN AW-Al Mn1Cu	0,6	0,7	0,05-0,20	1,0-1,5	—	—	
EN AW-3004	EN AW-Al Mn1Mg1	0,30	0,7	0,25	1,0-1,5	0,8-1,3	—	
EN AW-3005	EN AW-Al Mn1Mg0,5	0,6	0,7	0,03	1,0-1,5	0,20-0,6	0,10	
EN AW-3005A	EN AW-Al Mn1Mg0,5(A)	0,7	0,08	0,03	1,0-1,5	0,20-0,6	0,10	
EN AW-3017	EN AW-Al Mn1Cu0,3	0,25	0,25-0,45	0,25-0,40	0,8-1,2	0,10	0,15	
EN AW-3102	EN AW-Al Mn0,2	0,40	0,7	0,10	0,05-0,40	—	—	
EN AW-3103	EN AW-Al Mn1	0,50	0,7	0,10	0,9-1,5	0,30	0,10	
EN AW-3103A	EN AW-Al Mn1(A)	0,50	0,7	0,10	0,7-1,4	0,30	0,10	
EN AW-3104	EN AW-Al Mn1Mg1Cu	0,6	0,8	0,05-0,25	0,8-1,4	0,8-1,3	—	
EN AW-3105	EN AW-Al Mn0,5Mg0,5	0,6	0,7	0,30	0,30-0,8	0,20-0,8	0,20	
EN AW-3105A	EN AW-Al Mn0,5Mg0,5(A)	0,6	0,7	0,30	0,30-0,8	0,20-0,8	0,20	
EN AW-3105B	EN AW-Al Mn0,6Mg0,5	0,7	0,9	0,30	0,30-0,9	0,20-0,8	0,20	
EN AW-3207	EN AW-Al Mn0,6	0,30	0,45	0,10	0,40-0,8	0,10	—	
EN AW-3207A	EN AW-Al Mn0,6(A)	0,35	0,6	0,25	0,30-0,8	0,40	0,20	

Table 2 Aluminium Series 3000

	Ni	Zn	Ti	Ga	V	Remarks	Other Impurities Individual	Total	Aluminium Min.
	—	0,05	0,03	—	0,05	—	0,03	0,10	Rest
	—	0,10	—	—	—	—	0,05	0,15	Rest
	—	0,25	—	—	—	—	0,05	0,15	Rest
	—	0,25	0,10	—	—	—	0,05	0,15	Rest
	—	0,40	0,10	—	—	—	0,05	0,15	Rest
	—	0,10	0,05	—	—	—	0,05	0,15	Rest
	—	0,30	0,10	—	—	—	0,05	0,15	Rest
	—	0,20	—	—	—	0,10 Zr+Ti[c]	0,05	0,15	Rest
	—	0,20	0,10	—	—	0,10 Zr+Ti	0,05	0,15	Rest
	—	0,25	0,10	0,05	0,05	—	0,05	0,15	Rest
	—	0,40	0,10	—	—	—	0,05	0,15	Rest
	—	0,25	0,10	—	—	—	0,05	0,15	Rest
	—	0,50	0,10	—	—	0,10 Pb	0,05	0,15	Rest
	—	0,10	—	—	—	—	0,05	0,15	Rest
	—	0,25	—	—	—	—	0,05	0,15	Rest

Table 3 Aluminium Series 5000

Description Numerical Symbol	Chemical	Si	Fe	Cu	Mn	Mg	Cr
EN AW-5005	EN AW-Al Mg1(B)	0,30	0,7	0,20	0,20	0,50-1,1	0,10
EN AW-5005A	EN AW-Al Mg1(C)	0,30	0,45	0,05	0,15	0,7-1,1	0,10
EN AW-5006	EN AW-Al Mg1Mn0,5	0,40	0,80	0,10	0,40-0,8	0,8-1,3	0,10
EN AW-5010	EN AW-Al Mg0,5Mn	0,40	0,7	0,25	0,10-0,30	0,20-0,6	0,15
EN AW-5018	EN AW-Al Mg3Mn0,4	0,25	0,40	0,05	0,20-0,6	2,6-3,6	0,30
EN AW-5019	EN AW-Al Mg5	0,40	0,50	0,10	0,10-0,6	4,5-5,6	0,20
EN AW-5026	EN AW-Al Mg4,5MnSiFe	0,55-1,4	0,20-1,0	0,20-1,0	0,6-1,8	3,9-4,9	0,30
EN AW-5040	EN AW-Al Mg1,5Mn	0,30	0,7	0,25	0,9-1,4	1,0-1,5	0,10-0,30
EN AW-5042	EN AW-Al Mg3,5Mn	0,20	0,35	0,15	0,20-0,50	3,0-4,0	0,10
EN AW-5049	EN AW-Al Mg2Mn0,8	0,40	0,50	0,10	0,50-1,1	1,6-2,5	0,30
EN AW-5050	EN AW-Al Mg1,5(C)	0,40	0,7	0,20	0,10	1,1-1,8	0,10
EN AW-5050A	EN AW-Al Mg1,5(D)	0,40	0,7	0,20	0,30	1,1-1,8	0,10
EN AW-5051A	EN AW-Al Mg2(B)	0,30	0,45	0,05	0,25	1,4-2,1	0,30
EN AW-5052	EN AW-Al Mg2,5	0,25	0,40	0,10	0,10	2,2-2,8	0,15-0,35
EN AW-5058	EN AW-Al Mg5Pb1,5	0,40	0,50	0,10	0,20	4,5-5,6	0,10
EN AW-5059	EN AW-Al Mg5,5MnZnZr	0,45	0,50	0,25	0,6-1,2	5,0-6,0	0,25
EN AW-5070	EN AW-Al Mg4MnZn	0,25	0,40	0,25	0,40-0,8	3,5-4,5	0,30
EN AW-5082	EN AW-Al Mg4,5	0,20	0,35	0,15	0,15	4,0-5,0	0,15
EN AW-5083	EN AW-Al Mg4,5Mn0,7	0,40	0,40	0,10	0,40-1,0	4,0-4,9	0,05-0,25
EN AW-5086	EN AW-Al Mg4	0,40	0,50	0,10	0,20-0,7	3,5-4,5	0,05-0,25
EN AW-5087	EN AW-Al Mg4,5MnZr	0,25	0,40	0,05	0,7-1,1	4,5-5,2	0,05-0,25
EN AW-5088	EN AW-Al Mg5Mn0,4	0,20	0,10-0,35	0,25	0,20-0,50	4,7-5,5	0,15
EN AW-5110	EN AW-Al 99,85Mg0,5	0,08	0,08	—	0,03	0,30-0,6	—
EN AW-5119	EN AW-Al Mg5(A)	0,25	0,40	0,05	0,20-0,6	4,5-5,6	0,30
EN AW-5119A	EN AW-Al Mg5(B)	0,25	0,40	0,05	0,20-0,6	4,5-5,6	0,30
EN AW-5149	EN AW-Al Mg2Mn0,8(A)	0,25	0,40	0,05	0,50-1,1	1,6-2,5	0,30
EN AW-5154A	EN AW-Al Mg3,5(A)	0,50	0,50	0,10	0,50	3,1-3,9	0,25
EN AW-5154B	EN AW-Al Mg3,5Mn0,3	0,35	0,45	0,05	0,15-0,45	3,2-3,8	0,10
EN AW-5182	EN AW-Al Mg4,5Mn0,4	0,20	0,35	0,15	0,20-0,50	4,0-5,0	0,10
EN AW-5183	EN AW-Al Mg4,5Mn0,7(A)	0,40	0,40	0,10	0,50-1,0	4,3-5,2	0,05-0,25
EN AW-5183A	EN AW-Al Mg4,5Mn0,7(C)	0,40	0,40	0,10	0,50-1,0	4,3-5,2	0,05-0,25
EN AW-5186	EN AW-Al Mg4Mn0,4	0,40	0,45	0,25	0,20-0,50	3,8-4,8	0,15

Table 3 Aluminium Series 5000

	Ni	Zn	Ti	Ga	V	Remarks	Other Impurities		Aluminium Min.
							Individual	Total	
	—	0,25	—	—	—	—	0,05	0,15	Rest
	—	0,20	—	—	—	—	0,05	0,15	Rest
	—	0,25	0,10	—	—	—	0,05	0,15	Rest
	—	0,30	0,10	—	—	—	0,05	0,15	Rest
	—	0,20	0,15	—	—	0,20-0,6 Mn + Crc	0,05	0,15	Rest
	—	0,20	0,20	—	—	0,10-0,6 Mn + Cr	0,05	0,15	Rest
	—	1,0	0,20	—	—	0,30 Zr	0,05	0,15	Rest
	—	0,25	—	—	—	—	0,05	0,15	Rest
	—	0,25	0,10	—	—	—	0,05	0,15	Rest
	—	0,20	0,10	—	—	—	0,05	0,15	Rest
	—	0,25	—	—	—	—	0,05	0,15	Rest
	—	0,25	—	—	—	—	0,05	0,15	Rest
	—	0,20	0,10	—	—	—	0,05	0,15	Rest
	—	0,10	—	—	—	—	0,05	0,15	Rest
	—	0,20	0,20	—	—	1,2-1,8 Pb	0,05	0,15	Rest
	—	0 , 4 0 - 0,9	0,20	—	—	0,05-0,25 Zr	0,05	0,15	Rest
	—	0 , 4 0 - 0,8	0,15	—	—	—	0,05	0,15	Rest
	—	0,25	0,15	—	—	—	0,05	0,15	Rest
	—	0,25	0,15	—	—	—	0,05	0,15	Rest
	—	0,25	0,15	—	—	—	0,05	0,15	Rest
	—	0,25	0,15	—	—	0,10-0,20 Zrc	0,05	0,15	Rest
	—	0 , 2 0 - 0,40	—	—	—	0,15 Zr	0,05	0,15	Rest
	—	0,05	0,02	—	—	—	0,02	—	Rest
	—	0,20	0,15	—	—	0,20-0,6 Mn + Crc	0,05	0,15	Rest
	—	0,20	0,15	—	—	0,20-0,6 Mn + Crc	0,05	0,15	Rest
	—	0,20	0,10	—	—	—	0,05	0,15	Rest
	—	0,20	0,20	—	—	0,10-0,50 Mn + Crc	0,05	0,15	Rest
	0,01	0,15	0,15	—	—	—	0,05	0,15	Rest
	—	0,25	0,10	—	—	—	0,05	0,15	Rest
	—	0,25	0,15	—	—	c	0,05	0,15	Rest
	—	0,25	0,15	—	—	e	0,05	0,15	Rest
	—	0,40	0,15	—	—	0,05 Zr	0,05	0,15	Rest

Table 3 Aluminium Series 5000

Description		Si	Fe	Cu	Mn	Mg	Cr
Numerical Symbol	Chemical						
EN AW-5187	EN AW-Al Mg4,5MnZr	0,25	0,45	0,25	0,20-0,50	3,8-4,8	0,15
EN AW-5210	EN AW-Al 99,9Mg0,5	0,06	0,04	—	0,03	0,35-0,6	—
EN AW-5249	EN AW-Al Mg2Mn0,8Zr	0,25	0,40	0,05	0,50-1,1	1,6-2,5	0,30
EN AW-5251	EN AW-Al Mg2Mn0,3	0,40	0,50	0,15	0,10-0,50	1,7-2,4	0,15
EN AW-5252	EN AW-Al Mg2,5(B)	0,08	0,10	0,10	0,10	2,2-2,8	—
EN AW-5283A	EN AW-Al Mg4,5Mn0,7(B)	0,30	0,30	0,03	0,50-1,0	4,5-5,1	0,05
EN AW-5305	EN AW-Al 99,85Mg1	0,08	0,08	—	0,03	0,7-1,1	—
EN AW-5310	EN AW-Al 99,98Mg0,5	0,01	0,008	—	—	0,35-0,6	—
EN AW-5352	EN AW-Al Mg2,5(A)	0,45 Si + Fe		0,10	0,10	2,2-2,8	0,10
EN AW-5354	EN AW-Al Mg2,5MnZr	0,25	0,40	0,05	0,50-1,0	2,4-3,0	0 , 0 5 - 0,20
EN AW-5356	EN AW-Al Mg5Cr(A)	0,25	0,40	0,10	0,05-0,20	4,5-5,5	0 , 0 5 - 0,20
EN AW-5356A	EN AW-Al Mg5Cr(B)	0,25	0,40	0,10	0,05-0,20	4,5-5,5	0 , 0 5 - 0,20
EN AW-5383	EN AW-Al Mg4,5Mn0,9	0,25	0,25	0,20	0,7-1,0	4,0-5,2	0,25
EN AW-5449	EN AW-Al Mg2Mn0,8(B)	0,40	0,7	0,30	0,6-1,1	1,6-2,6	0,30
EN AW-5454	EN AW-Al Mg3Mn	0,25	0,40	0,10	0,50-1,0	2,4-3,0	0 , 0 5 - 0,20
EN AW-5456	EN AW-Al Mg5Mn1	0,25	0,40	0,10	0,50-1,0	4,7-5,5	0 , 0 5 - 0,20
EN AW-5456A	EN AW-Al Mg5Mn1(A)	0,25	0,40	0,05	0,7-1,1	4,5-5,2	0 , 0 5 - 0,25
EN AW-5456B	EN AW-Al Mg5Mn1(B)	0,25	0,40	0,05	0,7-1,1	4,5-5,2	0 , 0 5 - 0,25
EN AW-5505	EN AW-Al 99,9Mg1	0,06	0,04	—	0,03	0,8-1,1	—
EN AW-5554	EN AW-Al Mg3Mn(A)	0,25	0,40	0,10	0,50-1,0	2,4-3,0	0 , 0 5 - 0,20
EN AW-5556A	EN AW-Al Mg5Mn	0,25	0,40	0,10	0,6-1,0	5,0-5,5	0 , 0 5 - 0,20
EN AW-5556B	EN AW-Al Mg5Mn(A)	0,25	0,40	0,10	0,6-1,0	5,0-5,5	0 , 0 5 - 0,20
EN AW-5605	EN AW-Al 99,98Mg1	0,01	0,008	—	—	0,8-1,1	—
EN AW-5654	EN AW-Al Mg3,5Cr	0,45 Si + Fe		0,05	0,01	3,1-3,9	0,15-0,35
EN AW-5654A	EN AW-5654A	0,45 Si + Fe		0,05	0,01	3,1-3,9	0,15-0,35
EN AW-5657	EN AW-Al 99,85Mg1(A)	0,08	0,10	0,10	0,03	0,6-1,0	—
EN AW-5754	EN AW-Al Mg3	0,40	0,40	0,10	0,50	2,6-3,6	0,30

Table 3 Aluminium Series 5000

	Ni	Zn	Ti	Ga	V	Remarks	Other Impurities		Aluminium Min.
							Individual	Total	
	—	0,40	0,15	—	—	0,10-0,20 Zre	0,05	0,15	Rest
	—	0,04	0,01	—	—	—	0,01	—	Rest
	—	0,20	0,15	—	—	0,10-0,20 Zrc	0,05	0,15	Rest
	—	0,15	0,15	—	—	—	0,05	0,15	Rest
	—	0,05	—	—	0,05	—	0,03	0,10	Rest
	0,03	0,10	0,03	—	—	0,05 Zrd	0,05	0,15	Rest
	—	0,05	0,02	—	—	—	0,02	—	Rest
	—	0,01	0,008	—	—	0,008 Fe + Ti	0,003	—	Rest
	—	0,10	0,10	—	—	—	0,05	0,15	Rest
	—	0,25	0,15	—	—	0,10-0,20 Zr	0,05	0,15	Rest
	—	0,10	0 , 0 6 - 0,20	—	—	c	0,05	0,15	Rest
	—	0,10	0 , 0 6 - 0,20	—	—	e	0,05	0,15	Rest
	—	0,40	0,15	—	—	0,20 Zr	0,05	0,15	Rest
	—	0,30	0,10	—	—	—	0,05	0,15	Rest
	—	0,25	0,20	—	—	—	0,05	0,15	Rest
	—	0,25	0,20	—	—	—	0,05	0,15	Rest
	—	0,25	0,15	—	—	c	0,05	0,15	Rest
	—	0,25	0,15	—	—	e	0,05	0,15	Rest
	—	0,04	0,01	—	—	—	0,01	—	Rest
	—	0,25	0 , 0 5 - 0,20	—	—	c	0,05	0,15	Rest
	—	0,20	0 , 0 5 - 0,20	—	—	c	0,05	0,15	Rest
	—	0,20	0 , 0 5 - 0,20	—	—	e	0,05	0,15	Rest
	—	0,01	0,008	—	—	0,008 Fe + Ti	0,003	—	Rest
	—	0,20	0 , 0 5 - 0,15	—	—	c	0,05	0,15	Rest
	—	0,20	0 , 0 5 - 0,15	—	—	e	0,05	0,1 5	Rest
	—	0,05	—	0,03	0,05	—	0,02	0,05	Rest
	—	0,20	0,15	—	—	0,10-0,6 Mn + Crc	0,05	0,15	Rest

Table 4 Aluminium Series 6000

Description		Si	Fe	Cu	Mn	Mg	Cr	
Numerical	Chemical Symbol							
EN AW-6003	EN AW-Al Mg1Si0,8	0,35-1,0	0,6	0,10	0,8	0,8-1,5	0,35	
EN AW-6005	EN AW-Al SiMg	0,6-0,9	0,35	0,10	0,10	0,40-0,6	0,10	
EN AW-6005A	EN AW-Al SiMg(A)	0,50-0,9	0,35	0,30	0,50	0,40-0,7	0,30	
EN AW-6005B	EN AW-Al SiMg(B)	0,45-0,8	0,30	0,10	0,10	0,40-0,8	0,10	
EN AW-6008	EN AW-Al SiMgV	0,50-0,9	0,35	0,30	0,30	0,40-0,7	0,30	
EN AW-6011	EN AW-Al Mg0,9Si0,9Cu	0,6-1,2	1,0	0,40-0,9	0,8	0,6-1,2	0,30	
EN AW-6012	EN AW-Al MgSiPb	0,6-1,4	0,50	0,10	0,40-1,0	0,6-1,2	0,30	
EN AW 6012A	EN AW-Al MgSiSn	0,6-1,4	0,50	0,40	0,20-1,0	0,6-1,2	0,30	
EN AW-6013	EN AW-Al Mg1Si0,8CuMn	0,6-1,0	0,50	0,6-1,1	0,20-0,8	0,8-1,2	0,10	
EN AW-6014	EN AW-Al Mg0,6Si0,6V	0,30-0,6	0,35	0,25	0,05-0,20	0,05-0,20	0,20	
EN AW-6015	EN AW-Al Mg1Si0,3Cu	0,20-0,40	0,10-0,30	0,10-0,25	0,10	0,8-1,1	0,10	
EN AW-6016	EN AW-Al Si1,2Mg0,4	1,0-1,5	0,50	0,20	0,20	0,25-0,6	0,10	
EN AW-6018	EN AW-Al Mg1SiPbMn	0,50-1,2	0,7	0,15-0,40	0,30-0,8	0,6-1,2	0,10	
EN AW-6023	EN AW-Al Si1Sn1MgBi	0,6-1,4	0,50	0,20-0,50	0,20-0,6	0,40-0,9	—	
EN AW-6025	EN AW-Al Mg2,5SiMnCu	0,8-1,5	0,7	0,20-0,7	0,6-1,4	2,1-3,0	0,20	
EN AW-6056	EN AW-Al Si1MgCuMn	0,7-1,3	0,50	0,50-1,1	0,40-1,0	0,6-1,2	0,25	
EN AW-6060	EN AW-Al MgSi	0,30-0,6	0,10-0,30	0,10	0,10	0,35-0,6	0,05	
EN AW-6061	EN AW-Al Mg1SiCu	0,40-0,8	0,7	0,15-0,40	0,15	0,8-1,2	0,0 4 - 0,35	
EN AW-6061A	EN AW-Al Mg1SiCu(A)	0,40-0,8	0,7	0,15-0,40	0,15	0,8-1,2	0,0 4 - 0,35	
EN AW-6063	EN AW-Al Mg0,7Si	0,20-0,6	0,35	0,10	0,10	0,45-0,9	0,10	
EN AW-6063A	EN AW-Al Mg0,7Si(A)	0,30-0,6	0,15-0,35	0,10	0,15	0,6-0,9	0,05	
EN AW-6065	EN AW-Al Mg1Bi1Si	0,40-0,8	0,7	0,15-0,40	0,15	0,8-1,2	0,15	
EN AW-6081	EN AW-Al Si0,9MgMn	0,7-1,1	0,50	0,10	0,10-0,45	0,6-1,0	0,10	
EN AW-6082	EN AW-Al Si1MgMn	0,7-1,3	0,50	0,10	0,40-1,0	0,6-1,2	0,25	
EN AW-6082A	EN AW-Al Si1MgMn(A)	0,7-1,3	0,50	0,10	0,40-1,0	0,6-1,2	0,25	
EN AW-6101	EN AW-Al MgSi	0,30-0,7	0,50	0,10	0,03	0,35-0,8	0,03	
EN AW-6101A	EN AW-Al MgSi(A)	0,30-0,7	0,40	0,05	—	0,40-0,9	—	
EN AW-6101B	EN AW-Al MgSi(B)	0,30-0,6	0,10-0,30	0,05	0,05	0,35-0,6	—	
EN AW-6106	EN AW-Al MgSiMn	0,30-0,6	0,35	0,25	0,05-0,20	0,40-0,8	0,20	
EN AW-6110A	EN AW-Al Mg0,9Si0,9Mn-Cu	0,7-1,1	0,50	0,30-0,8	0,30-0,9	0,7-1,1	0,0 5 - 0,25	
EN AW-6181	EN AW-Al Si1Mg0,8	0,8-1,2	0,45	0,10	0,15	0,6-1,0	0,10	
EN AW-6182	EN AW-Al Si1MgZr	0,9-1,3	0,50	0,10	0,50-1,0	0,7-1,2	0,25	
EN AW-6201	EN AW-Al Mg0,7Si	0,50-0,9	0,50	0,10	0,03	0,6-0,9	0,03	
EN AW-6261	EN AW-Al Mg1SiCuMn	0,40-0,7	0,40	0,15-0,40	0,20-0,35	0,7-1,0	0,10	

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Table 4 Aluminium Series 6000

	Ni	Zn	Ti	Ga	V	Remarks	Other Impurities		Aluminium Min.
							Individual	Total	
	—	0,20	0,10	—	—	—	0,05	0,15	Rest
	—	0,10	0,10	—	—	—	0,05	0,15	Rest
	—	0,20	0,10	—	—	0,12-0,50 Mn + Cr	0,05	0,15	Rest
	—	0,10	0,10	—	—	—	0,05	0,15	Rest
	—	0,20	0,10	—	0,05-0,20	—	0,05	0,15	Rest
	0,20	1,5	0,20	—	—	—	0,05	0,15	Rest
	—	0,30	0,20	—	—	0,7 Bi; 0,40-2,0 Pb	0,05	0,15	Rest
	—	0,30	0,20	—	—	0,7 Bi; 0,40-2,0 Sn	0,05	0,15	Rest
	—	0,25	0,10	—	—	—	0,05	0,15	Rest
	—	0,10	0,10	—	—	—	0,05	0,15	Rest
	—	0,10	0,10	—	—	—	0,05	0,15	Rest
	—	0,20	0,15	—	—	—	0,05	0,15	Rest
	—	0,30	0,20	—	—	c	0,05	0,15	Rest
	—	—	—	—	—	0,6-1,2 Sn	0,05	0,15	Rest
	—	0,50	0,20	—	—	—	0,05	0,15	Rest
	—	0,10-0,7	d	—	—	d	0,05	0,15	Rest
	—	0,15	0,10	—	—	—	0,05	0,15	Rest
	—	0,25	0,15	—	—	—	0,05	0,15	Rest
	—	0,25	0,15	—	—	e	0,05	0,15	Rest
	—	0,10	0,10	—	—	—	0,05	0,15	Rest
	—	0,15	0,10	—	—	—	0,05	0,15	Rest
	—	0,25	0,10	—	—	0,50-1,5 Bi; 0,05 Pb; 0,15 Zr	0,05	0,15	Rest
	—	0,20	0,15	—	—	0,20-0,6 Mn + Crc	0,05	0,15	Rest
	—	0,20	0,15	—	—	0,20-0,6 Mn + Crc	0,05	0,15	Rest
	—	0,20	0,10	—	—	e	0,05	0,15	Rest
	—	0,10	—	—	—	0,06 B	0,03	0,10	Rest
	—	—	—	—	—	—	0,03	0,10	Rest
	—	0,10	—	—	—	—	0,03	0,10	Rest
	—	0,10	—	—	—	—	0,05	0,10	Rest
	—	0,20	—	—	—	0,20 Ti + Zr	0,05	0,15	Rest
	—	0,20	0,10	—	—	—	0,05	0,15	Rest
	—	0,20	0,10	—	—	0,05-0,20 Zr	0,05	0,15	Rest
	—	0,10	—	—	—	0,06 B	0,03	0,10	Rest
	—	0,20	0,10	—	—	—	0,05	0,15	Rest

Table 4 Aluminium Series 6000

Description		Si	Fe	Cu	Mn	Mg	Cr	
Numerical	Chemical Symbol							
EN AW-6262	EN AW-Al Mg1SiPb	0,40-0,8	0,7	0,15-0,40	0,15	0,8-1,2	0,0 4 - 0,14	
EN AW-6262A	EN AW-Al Mg1SiSn	0,40-0,8	0,7	0,15-0,40	0,15	0,8-1,2	0,0 4 - 0,14	
EN AW-6351	EN AW-Al Si1Mg0,5Mn	0,7-1,3	0,50	0,10	0,40-0,8	0,40-0,8	—	
EN AW-6351A	EN AW-Al Si1Mg0,5Mn(A)	0,7-1,3	0,50	0,10	0,40-0,8	0,40-0,8	—	
EN AW-6360	EN AW-Al SiMgMn	0,35-0,8	0,10-0,30	0,15	0,02-0,15	0,05	—	
EN AW-6401	EN AW-Al 99,9MgSi	0,35-0,7	0,04	0,05-0,20	0,03	0,35-0,7	—	
EN AW-6463	EN AW-Al Mg0,7Si(B)	0,20-0,6	0,15	0,20	0,05	0,45-0,9	—	
EN AW-6951	EN AW-Al MgSi0,3Cu	0,20-0,50	0,8	0,15-0,40	0,10	0,40-0,8	—	

Table 4 Aluminium Series 6000

	Ni	Zn	Ti	Ga	V	Remarks	Other Impurities		Aluminium Min.
							Individual	Total	
	—	0,25	0,15	—	—	f	0,05	0,15	Rest
	—	0,25	0,10	—	—	0,40-0,9 Bi;	0,05	0,15	Rest
	—	0,20	0,20	—	—	—	0,05	0,15	Rest
	—	0,20	0,20	—	—	e	0,05	0,15	Rest
	—	0,10	0,10	—	—	—	0,05	0,15	Rest
	—	0,04	0,01	—	—	—	0,01	—	Rest
	—	0,05	—	—	—	—	0,05	0,15	Rest
	—	0,20	—	—	—	—	0,05	0,15	Rest

Table 5 Alloy EN AW-3003 [Al Mn1Cu]

Temper	Specified thickness mm		Tensile strength R_m MPa		Yield strength $R_{p0,2}$ MPa		Elongation min. %		Bend radius[a]		Hardness HBW[a]
	over	up to	min.	max.	min.	max.	$A_{50\ mm}$	A	180°	90°	
F[a]	2,5	80,0	95								
O	0,2	0,5	95	135	35		15		0_t	0_t	28
	0,5	1,5	95	135	35		17		0_t	0_t	28
	1,5	3,0	95	135	35		20		0_t	0_t	28
	3,0	6,0	95	135	35		23		$1,0_t$	$1,0_t$	28
	6,0	12,5	95	135	35		24			$1,5_t$	28
	12,5	50,0	95	135	35			23			28
H111	0,2	0,5	95	135	35		15		0_t	0_t	28
	0,5	1,5	95	135	35		17		0_t	0_t	28
	1,5	3,0	95	135	35		20		0_t	0_t	28
	3,0	6,0	95	135	35		23		$1,0_t$	$1,0_t$	28
	6,0	12,5	95	135	35		24			$1,5_t$	28
	12,5	50,0	95	135	35			23			28
H112	6,0	12,5	115		70		10	18			35
	12,5	80,0	100		40						29
H12	0,2	0,5	120	160	90		3		$1,5_t$	0_t	38
	0,5	1,5	120	160	90		4		$1,5_t$	$0,5_t$	38
	1,5	3,0	120	160	90		5		$1,5_t$	$1,0_t$	38
	3,0	6,0	120	160	90		6			$1,0_t$	38
	6,0	12,5	120	160	90		7			$2,0_t$	38
	12,5	40,0	120	160	90			8			38
H14	0,2	0,5	145	185	125		2		$2,0_t$	$0,5_t$	46
	0,5	1,5	145	185	125		2		$2,0_t$	$1,0_t$	46
	1,5	3,0	145	185	125		3		$2,0_t$	$1,0_t$	46
	3,0	6,0	145	185	125		4			$2,0_t$	46
	6,0	12,5	145	185	125		5			$2,5_t$	46
	12,5	25,0	145	185	125			5			46
H16	0,2	0,5	170	210	150		1		$2,5_t$	$1,0_t$	54
	0,5	1,5	170	210	150		2		$2,5_t$	$1,5_t$	54
	1,5	4,0	170	210	150		2		$2,5_t$	$2,0_t$	54
H18	0,2	0,5	190		170		1			$1,5_t$	60
	0,5	1,5	190		170		2			$2,5_t$	60
	1,5	3,0	190		170		2			$3,0_t$	60
H19	0,2	0,5	210		180		1				65
	0,5	1,5	210		180		2				65
	1,5	3,0	210		180		2				65
H22	0,2	0,5	120	160	80		6		$1,0_t$	0_t	37
	0,5	1,5	120	160	80		7		$1,0_t$	$0,5_t$	37
	1,5	3,0	120	160	80		8		$1,0_t$	$1,0_t$	37
	3,0	6,0	120	160	80		9			$1,0_t$	37
	6,0	12,5	120	160	80		11			$2,0_t$	37
H24	0,2	0,5	145	185	115		4		$1,5_t$	$0,5_t$	45
	0,5	1,5	145	185	115		4		$1,5_t$	$1,0_t$	45
	1,5	3,0	145	185	115		5		$1,5_t$	$1,0_t$	45
	3,0	6,0	145	185	115		6			$2,0_t$	45
	6,0	12,5	145	185	110		8			$2,5_t$	45
H26	0,2	0,5	170	210	140		2		$2,0_t$	$1,0_t$	53
	0,5	1,5	170	210	140		3		$2,0_t$	$1,5_t$	53
	1,5	4,0	170	210	140		3		$2,0_t$	$2,0_t$	53
H28	0,2	0,5	190	160			2			$1,5_t$	59
	0,5	1,5	190	160			2			$2,5_t$	59
	1,5	3,0	190	160			3			$3,0_t$	59

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Table 6 Alloy EN AW-3004 [Al Mn1Mg1]

Temper	Specified thickness mm		Tensile strengt h R_m MPa		Yield strength $R_{p0,2}$ MPa		Elongation min. %		Bend radius[a]		Hardness HBW[a]
	over	up to	min.	max.	min.	max.	$A_{50\ mm}$	A	180°	90°	
F[a]	2,5	80,0	155								
O	0,2	0,5	155	200	60		13		0 t	0 t	45
	0,5	1,5	155	200	60		14		0 t	0 t	45
	1,5	3,0	155	200	60		15		0,5 t	0 t	45
	3,0	6,0	155	200	60		16		1,0 t	1,0 t	45
	6,0	12,5	155	200	60		16			2,0 t	45
	12,5	50,0	155	200	60						45
H111	0,2	0,5	155	200	60		13		0 t	0 t	45
	0,5	1,5	155	200	60		14		0 t	0 t	45
	1,5	3,0	155	200	60		15		0,5 t	0 t	45
	3,0	6,0	155	200	60		16		1,0 t	1,0 t	45
	6,0	12,5	155	200	60		16			2,0 t	45
	12,5	50,0	155	200	60			14			45
H12	0,2	0,5	190	240	155		2		1,5 t	0 t	59
	0,5	1,5	190	240	155		3		1,5 t	0,5 t	59
	1,5	3,0	190	240	155		4		2,0 t	1,0 t	59
	3,0	6,0	190	240	155		5			1,5 t	59
H14	0,2	0,5	220	265	180		1		2,5 t	0,5 t	67
	0,5	1,5	220	265	180		2		2,5 t	1,0 t	6
	1,5	3,0	220	265	180		2		2,5 t	1,5 t	67
	3,0	6,0	220	265	180		3			2,0 t	67
H16	0,2	0,5	240	285	200		1		3,5 t	1,0 t	73
	0,5	1,5	240	285	200		1		3,5 t	1,5 t	73
	1,5	4,0	240	285	200		2			2,5 t	73
H18	0,2	0,5	260	230			1			1,5 t	80
	0,5	1,5	260	230			1			2,5 t	80
	1,5	3,0	260	230			2				80
H19	0,2	0,5	270	240			1				83
	0,5	1,5	270	240			1				83
H22	0,2	0,5	190	240	145		4		1,0 t	0 t	58
	0,5	1,5	190	240	145		5		1,0 t	0,5 t	58
	1,5	3,0	190	240	145		6		1,5 t	1,0 t	58
	3,0	6,0	190	240	145		7			1,5 t	58
H32	0,2	0,5	190	240	145		4		1,0 t	0 t	58
	0,5	1,5	190	240	145		5		1,0 t	0,5 t	58
	1,5	3,0	190	240	145		6		1,5 t	1,0 t	58
	3,0	6,0	190	240	145		7			1,5 t	58
H24	0,2	0,5	220	265	170		3		2,0 t	0,5 t	66
	0,5	1,5	220	265	170		4		2,0 t	1,0 t	66
	1,5	3,0	220	265	170		4		2,0 t	1,5 t	66
H34	0,2	0,5	220	265	170		3		2,0 t	0,5 t	66
	0,5	1,5	220	265	170		4		2,0 t	1,0 t	66
	1,5	3,0	220	265	170		4		2,0 t	1,5 t	66
H26	0,2	0,5	240	285	190		3		3,0 t	1,0 t	72
	0,5	1,5	240	285	190		3		3,0 t	1,5 t	72
	1,5	3,0	240	285	190		3			2,5 t	72
H36	0,2	0,5	240	285	190		3		3,0 t	1,0 t	72
	0,5	1,5	240	285	190		3		3,0 t	1,5 t	72
	1,5	3,0	240	285	190		3			2,5 t	72
H28	0,2	0,5	260	220			2			1,5 t	79
	0,5	1,5	260	220			3			2,5 t	79
H38	0,2	0,5	260	220			2			1,5 t	79
	0,5	1,5	260	220			3			2,5 t	79

Table 7 Alloy EN AW-3005 [Al Mn1Mg0,5]

Temper	Specified thickness mm		Tensile strength R_m MPa		Yield strength $R_{p0,2}$ MPa		Elongation min. %		Bend radius[a]		Hardness HBW[a]
	over	up to	min.	max.	min.	max.	$A_{50\ mm}$	A	180°	90°	
F[a]	2,5	80,0	115								
O	0,2	0,5	115	165	45		12		0 t	0 t	33
	0,5	1,5	115	165	45		14		0 t	0 t	33
	1,5	3,0	115	165	45		16		1,0 t	0,5 t	33
	3,0	6,0	115	165	45		19			1,0 t	33
H111	0,2	0,5	115	165	45		12		0 t	0 t	33
	0,5	1,5	115	165	45		14		0 t	0 t	33
	1,5	3,0	115	165	45		16		1,0 t	0,5 t	33
	3,0	6,0	115	165	45		19			1,0 t	33
H12	0,2	0,5	145	195	125		3		1,5 t	0 t	46
	0,5	1,5	145	195	125		4		1,5 t	0,5 t	46
	1,5	3,0	145	195	125		4		2,0 t	1,0 t	46
	3,0	6,0	145	195	125		5			1,5 t	46
H14	0,2	0,5	170	215	150		1		2,5 t	0,5 t	54
	0,5	1,5	170	215	150		2		2,5 t	1,0 t	54
	1,5	3,0	170	215	150		2			1,5 t	54
	3,0	6,0	170	215	150		3			2,0 t	54
H16	0,2	0,5	195	240	175		1			1,0 t	61
	0,5	1,5	195	240	175		2			1,5 t	61
	1,5	4,0	195	240	175		2			2,5 t	61
H18	0,2	0,5	220		200		1			1,5 t	69
	0,5	1,5	220		200		2			2,5 t	69
	1,5	3,0	220		200		2				69
H19	0,2	0,5	235		210		1				73
	0,5	1,5	235		210		1				73
H22	0,2	0,5	145	195	110		5		1,0 t	0 t	45
	0,5	1,5	145	195	110		5		1,0 t	0,5 t	45
	1,5	3,0	145	195	110		6		1,5 t	1,0 t	45
	3,0	6,0	145	195	110		7			1,5 t	45
H24	0,2	0,5	170	215	130		4		1,5 t	0,5 t	52
	0,5	1,5	170	215	130		4		1,5 t	1,0 t	52
	1,5	3,0	170	215	130		4			1,5 t	52
H26	0,2	0,5	195	240	160		3			1,0 t	60
	0,5	1,5	195	240	160		3			1,5 t	60
	1,5	3,0	195	240	160		3			2,5 t	60
H28	0,2	0,5	220		190		2			1,5 t	68
	0,5	1,5	220		190		2			2,5 t	68
	1,5	3,0	220		190		3				68

a For information only.

Technical

Table 8 Alloy EN AW-3105 [Al Mn0,5Mg0,5]

Temper	Specified thickness mm		Tensile strength R_m MPa		Yield strength $R_{p0,2}$ MPa		Elongation min. %		Bend radius[a]		Hardness HBW[a]
	over	up to	min.	max.	min.	max.	$A_{50\ mm}$	A	180°	90°	
F[a]	2,5	80,0	100								
O	0,2	0,5	100	155	40		14		0 t		29
	0,5	1,5	100	155	40		15		0 t		29
	1,5	3,0	100	155	40		17		0,5 t		29
H111	0,2	0,5	100	155	40		14		0 t		29
	0,5	1,5	100	155	40		15		0 t		29
	1,5	3,0	100	155	40		17		0,5 t		29
H12	0,2	0,5	130	180	105		3		1,5 t		41
	0,5	1,5	130	180	105		4		1,5 t		41
	1,5	3,0	130	180	105		4		1,5 t		41
H14	0,2	0,5	150	200	130		2		2,5 t		48
	0,5	1,5	150	200	130		2		2,5 t		48
	1,5	3,0	150	200	130		2		2,5 t		48
H16	0,2	0,5	175	225	160		1				56
	0,5	1,5	175	225	160		2				56
	1,5	3,0	175	225	160		2				56
H18	0,2	0,5	195	180			1				62
	0,5	1,5	195	180			1				62
	1,5	3,0	195	180			1				62
H19	0,2	0,5	215	190			1				67
	0,5	1,5	215	190			1				67
H22	0,2	0,5	130	180	105		6				41
	0,5	1,5	130	180	105		6				41
	1,5	3,0	130	180	105		7				41
H24	0,2	0,5	150	200	120		4		2,5 t		47
	0,5	1,5	150	200	120		4		2,5 t		47
	1,5	3,0	150	200	120		5		2,5 t		47
H26	0,2	0,5	175	225	150		3				55
	0,5	1,5	175	225	150		3				55
	1,5	3,0	175	225	150		3				55
H28	0,2	0,5	195		170		2				61
	0,5	1,5	195		170		2				61

a For information only.

Table 9 Alloy EN AW-5005 [Al Mg1(B)], alloy EN AW-5005A [Al Mg1(C)]

Temper	Specified thickness mm		Tensile strength R_m MPa		Yield strength $R_{p0,2}$ MPa		Elongation min. %		Bend radius[a]		Hardness HBW[a]
	over	up to	min.	max.	min.	max.	$A_{50\ mm}$	A	180°	90°	
F[a]	2,5	80,0	100								
O	0,2	0,5	100	145	35		15		0 t	0 t	29
	0,5	1,5	100	145	35		19		0 t	0 t	29
	1,5	3,0	100	145	35		20		0,5 t	0 t	29
	3,0	6,0	100	145	35		22		1,0 t	1,0 t	29
	6,0	12,5	100	145	35		24			1,5 t	29
	12,5	50,0	100	145	35			20			29
H111	0,2	0,5	100	145	35		15		0 t	0 t	29
	0,5	1,5	100	145	35		19		0 t	0 t	29
	1,5	3,0	100	145	35		20		0,5 t	0 t	29
	3,0	6,0	100	145	35		22		1,0 t	1,0 t	29
	6,0	12,5	100	145	35		24			1,5 t	29
	12,5	50,0	100	145	35			20			29
H12	0,2	0,5	125	165	95		2		1,0 t	0 t	39
	0,5	1,5	125	165	95		2		1,0 t	0,5 t	39
	1,5	3,0	125	165	95		4		1,5 t	1,0 t	39
	3,0	6,0	125	165	95		5			1,0 t	39
	6,0	12,5	125	165	95		7			2,0 t	39
H14	0,2	0,5	145	185	120		2		2,0 t	0,5 t	48
	0,5	1,5	145	185	120		2		2,0 t	1,0 t	48
	1,5	3,0	145	185	120		3		2,5 t	1,0 t	48
	3,0	6,0	145	185	120		4			2,0 t	48
	6,0	12,5	145	185	120		5			2,5 t	48
H16	0,2	0,5	165	205	145		1			1,0 t	52
	0,5	1,5	165	205	145		2			1,5 t	52
	1,5	3,0	165	205	145		3			2,0 t	52
	3,0	4,0	165	205	145		3			2,5 t	52
H18	0,2	0,5	185		165		1			1,5 t	58
	0,5	1,5	185		165		2			2,5 t	58
	1,5	3,0	185		165		2			3,0 t	58
H19	0,2	0,5	205		185		1				64
	0,5	1,5	205		185		2				64
	1,5	3,0	205		185		2				64
H22	0,2	0,5	125	165	80		4		1,0 t	0 t	38
	0,5	1,5	125	165	80		5		1,0 t	0,5 t	38
	1,5	3,0	125	165	80		6		1,5 t	1,0 t	38
	3,0	6,0	125	165	80		8			1,0 t	38
	6,0	12,5	125	165	80		10			2,0 t	38
H32	0,2	0,5	125	165	80		4		1,0 t	0 t	38
	0,5	1,5	125	165	80		5		1,0 t	0,5 t	38
	1,5	3,0	125	165	80		6		1,5 t	1,0 t	38
	3,0	6,0	125	165	80		8			1,0 t	38
	6,0	12,5	125	165	80		10			2,0 t	38
H24	0,2	0,5	145	185	110		3		1,5 t	0,5 t	47
	0,5	1,5	145	185	110		4		1,5 t	1,0 t	47
	1,5	3,0	145	185	110		5		2,0 t	1,0 t	47
	3,0	6,0	145	185	110		6			2,0 t	47
	6,0	12,5	145	185	110		8			2,5 t	47
H34	0,2	0,5	145	185	110		3		1,5 t	0,5 t	47
	0,5	1,5	145	185	110		4		1,5 t	1,0 t	47
	1,5	3,0	145	185	110		5		2,0 t	1,0 t	47
	3,0	6,0	145	185	110		6			2,0 t	47
	6,0	12,5	145	185	110		8			2,5 t	47
H26	0,2	0,5	165	205	135		2			1,0 t	52
	0,5	1,5	165	205	135		3			1,5 t	52
	1,5	3,0	165	205	135		4			2,0 t	52
	3,0	4,0	165	205	135		4			2,5 t	52
H36	0,2	0,5	165	205	135		2			1,0 t	52
	0,5	1,5	165	205	135		3			1,5 t	52
	1,5	3,0	165	205	135		4			2,0 t	52
	3,0	4,0	165	205	135		4			2,5 t	52
H28	0,2	0,5	185		160		1			1,5 t	58
	0,5	1,5	185		160		2			2,5 t	58
	1,5	3,0	185		160		3			3,0 t	58
H38	0,2	0,5	185		160		1			1,5 t	58
	0,5	1,5	185		160		2			2,5 t	58
	1,5	3,0	185		160		3			3,0 t	58

a For information only.

Technical

Annexure 2

TDS of

AludecoR
Metal Composite Panel

ALUDECOR CCP TECHNICAL SPECIFICATION

Technical

DESCRIPTION OF TEST	STANDARD	UNIT	CCP	CCP FR
PRODUCT DETAIL AND THICKNESS		mm	4	4
COIL THICKNESS COPPER ALLOY	EN1 652	mm	0.21	0.21
COIL THICKNESS ALUMINIUM ALLOY	EN 485-2	mm	0.5	0.5
MECHANICAL PROPERTIES				
COPPER COIL				
TENSILE STRENGTH	ASTM E8	N/mm^2	240	240
TENSILE YIELD	ASTM E8	N/mm^2	180	180
ELONGATION	ASTM E8	%	8	8
ALUMINIUM COIL				
TENSILE STRENGTH	ASTM E8	N/mm^2	150	150
TENSILE YIELD	ASTM E8	N/mm^2	130	130
ELONGATION	ASTM E8	%	2	2
CCP				
WEIGHT		Kg/m^2	6.64	8.8
TENSILE STRENGTH	ASTM E8	N/mm^2	45	45
TENSILE YIELD	ASTM E8	N/mm^2	40	40
ELONGATION	ASTM E8	%	10	10
PEEL STRENGTH	ASTM D 903	N-mm	8	8
FLEXURAL STRENGTH	ASTM D 790	N/mm^2	140	140
FLEXURAL MODULUS	ASTM D 790	N/mm^2	16X10^3	16X10^3
DEFLECTION TEMPERATURE	ASTM D 648	^{0}C	240	240
WATER ABSORPTION	ASTM C 272	%	NIL	NIL
FIRE PROPERTIES				
REACTION TO FIRE	EN 13501-1			Class B
RESISTANCE TO FIRE	ASM E119-12	hrs		2

PRODUCT TOLERANCE Panel Width ±2.0mm; Panel Length ±4.0mm; Panel Thickness ±0.2mm; Maximum Squareness 5.0mm; Maximum Bow 0.5% of width and/or length; Coil Thickness ±0.03mm

ALUDECOR ZCP TECHNICAL SPECIFICATION

AludecoR Metal Composite Panel

Technical

DESCRIPTION OF TEST	STANDARD	UNIT	ZCP	ZCP FR
PRODUCT DETAIL AND THICKNESS		mm	4	4
COIL THICKNESS ZINC ALLOY	EN 988	mm	0.5	0.5
COIL THICKNESS ALUMINIUM ALLOY	EN 485-2	mm	0.5	0.5

MECHANICAL PROPERTIES				
ZINC COIL				
TENSILE STRENGTH	ASTM E8	N/mm2	150	150
TENSILE YIELD	ASTM E8	N/mm2	100	100
ELONGATION	ASTM E8	%	35	35

ALUMINIUM COIL				
TENSILE STRENGTH	ASTM E8	N/mm^2	150	150
TENSILE YIELD	ASTM E8	N/mm^2	130	130
ELONGATION	ASTM E8	%	2	2

ZCP				
WEIGHT		Kg/m2	7.5	9.35
TENSILE STRENGTH	ASTM E8	N/mm2	50	50
TENSILE YIELD	ASTM E8	N/mm2	45	45
ELONGATION	ASTM E8	%	10	10
PEEL STRENGTH	ASTM D 903	N-mm	10	10
FLEXURAL STRENGTH	ASTM D 790	N/mm2	145	145
DEFLECTION TEMPERATURE	ASTM D 648	ºC	240	240
WATER ABSORPTION	ASTM C 272	%	NIL	NIL

FIRE PROPERTIES				
REACTION TO FIRE	EN 13501-1			Class B
RESISTANCE TO FIRE	ASM E119-12	hrs		2

PRODUCT TOLERANCE Panel Width ±2.0mm; Panel Length ±4.0mm; Panel Thickness ±0.2mm; Maximum Squareness 5.0mm; Maximum Bow 0.5% of width and/or length; Coil Thickness ±0.03mm

ALUDECOR AL 65 TECHNICAL SPECIFICATION

Technical

SL.NO.	DESCRIPTION	STANDARD	UNIT	AL 65
A.	**PRODUCT DETAILS & THICKNESS**		mm	6
1	COVER SHEET THICKNESS		mm	0.5
2	ALLOY	ASTM B209 M		AA3105
3	CORE MATERIAL		**LDPE**	
B.	**ALLOY DESCRIPTION**	ASTM B209 M		H16
C.	**PHYSICAL PROPERTIES (For ACM)**			
1	WEIGHT	ASTM D592	Kg/m^2	7.76
2	WATER ABSORPTION	ASTM C272	%	NIL
3	COEFFICIENT OF THERMAL EXPANSION-α	ASTM D696	$^{O}/C$	24.0×10^{-6}
D.	**MECHANICAL PROPERTIES**			
	ALUMINIUM SKIN			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	Min. 145
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	Min. 120
3	ELONGATION	ASTM E8	%	Min. 3
4	MODULUS OF ELASTICITY	ASTM E8	$Mpa(N/mm^2)$	> 68000
5	SURFACE RESISTIVITY (STATIC CHARGE)	ASTM D257	Ω	1.6×10^{12}
E.	**ALUMINIUM COMPOSITE PANEL**			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	45
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	40
3	BOND INTEGRITY (PEEL STRENGTH)	ASTM D903	N/mm	Min. 7
4	ELONGATION	ASTM E8	%	5
5	FLEXURAL STRENGTH	ASTM D790	$Mpa(N/mm^2)$	116
6	FLEXURAL STIFFNESS/RIGIDITY	ASTM D790	$Mpa(N/mm^2)$	14034
7	SHEAR STRENGTH	ASTM D732	$Mpa(N/mm^2)$	18
8	SOUND TRANSMISSION CLASS	ASTM E 413	dB	26
F.	**COATING DETAILS**			
1	**COATING TYPE**	AAMA 2605	**PVDF/Lumiflon resin based Flurocarbon Coating**	
2	**COATING THICKNESS**	AAMA 2605	**25-28µ (For Two Coat) 30-35µ (For Three Coat)**	
3	**GLOSS (60^{O})**	ASTM D523	%	**15-60**
4	**FORMABILITY (T-Bend)**	ASTM D1737	T	**2T**
5	**REVERSE IMPACT- CROSSHATCH**	NCCA II-5		**No Pick Up**
6	**PENCIL HARDNESS**	ASTM D3363	min	**H**
7	**ADHESION**	ASTM D3359		
i	DRY	METHOD 8		**No Pick Up**
ii	WET	$37.8^{O}C$, 24hrs		**No Pick Up**
iii	BOILING WATER	$100^{O}C$, 20min		**No Pick Up**
8	**ABRASION RESISTANCE**	ASTM D968	Litres/Millilitres	**40**
9	**CHEMICAL RESISTANCE TEST**	ASTM D543		
i	10% HCL (1hrs)		**No Visual Change**	
ii	20% H_2SO_4 (72hrs)		**No Visual Change**	
iii	20% NaOH (18hrs)		**No Visual Change**	
iv	3% Detergent Solution ($38^{O}C$ for 72hrs)		**No Visual Change**	
v	Mortar pat test	AAMA 2605	**No Visual Change**	
10	**WEATHER-O-METER TEST**	ASTM D2244		
i	GLOSS RETENTION		**70% after 4000 hrs**	
ii	COLOR RETENTION		**Max. 5 Units after 4000 hrs**	
iii	CHALK RESISTANCE		**Max. 8 Units after 4000 hrs**	

PRODUCT TOLERANCE : Panel Width: ± 2.0 mm; Panel Length: ± 4.0 mm; Panel Thickness: ± 0.2mm; Maximum Squareness: 5.0 mm; Maximum Bow: 0.5% of width and/or length; Coil Thickness: 0.03mm Tolerance

ALUDECOR AL 65 FireWall BS 476 Class O
TECHNICAL SPECIFICATION

SL.NO.	DESCRIPTION	STANDARD	UNIT	AL 65
A.	**PRODUCT DETAILS & THICKNESS**		mm	6
1	COVER SHEET THICKNESS		mm	0.5
2	ALLOY	ASTM B209 M		AA3105
3	CORE MATERIAL		**Mineral Core**	
B.	**ALLOY DESCRIPTION**	ASTM B209 M		H16
C.	**PHYSICAL PROPERTIES (For ACM)**			
1	WEIGHT	ASTM D592	Kg/m^2	9.6
2	WATER ABSORPTION	ASTM C272	%	NIL
3	COEFFICIENT OF THERMAL EXPANSION-α	ASTM D696	$^{O}/C$	24.0×10^{-6}
D.	**MECHANICAL PROPERTIES**			
	ALUMINIUM SKIN			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	Min. 145
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	Min. 120
3	ELONGATION	ASTM E8	%	Min. 3
4	MODULUS OF ELASTICITY	ASTM E8	$Mpa(N/mm^2)$	> 68000
5	SURFACE RESISTIVITY (STATIC CHARGE)	ASTM D257	Ω	1.6×10^{12}
E.	**ALUMINIUM COMPOSITE PANEL**			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	45
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	40
3	BOND INTEGRITY (PEEL STRENGTH)	ASTM D903	N/mm	Min. 7
4	ELONGATION	ASTM E8	%	5
5	FLEXURAL STRENGTH	ASTM D790	$Mpa(N/mm^2)$	116
6	FLEXURAL STIFFNESS/RIGIDITY	ASTM D790	$Mpa(N/mm^2)$	14034
7	SHEAR STRENGTH	ASTM D732	$Mpa(N/mm^2)$	18
8	SOUND TRANSMISSION CLASS	ASTM E 413	dB	26
F.	**COATING DETAILS**			
1	**COATING TYPE**	AAMA 2605	**PVDF/Lumiflon resin based Flurocarbon Coating**	
2	**COATING THICKNESS**	AAMA 2605	**25-28µ (For Two Coat) 30-35µ (For Three Coat)**	
3	**GLOSS (60^{O})**	ASTM D523	%	**15-60**
4	**FORMABILITY (T-Bend)**	ASTM D1737	T	**2T**
5	**REVERSE IMPACT- CROSSHATCH**	NCCA II-5		**No Pick Up**
6	**PENCIL HARDNESS**	ASTM D3363	min	**H**
7	**ADHESION**	ASTM D3359		
i	DRY	METHOD 8		**No Pick Up**
ii	WET	$37.8^{O}C$, 24hrs		**No Pick Up**
iii	BOILING WATER	$100^{O}C$, 20min		**No Pick Up**
8	**ABRASION RESISTANCE**	ASTM D968	Litres/Millilitres	**40**
9	**CHEMICAL RESISTANCE TEST**	ASTM D543		
i	10% HCL (1hrs)		**No Visual Change**	
ii	20% H_2SO_4 (72hrs)		**No Visual Change**	
iii	20% NaOH (18hrs)		**No Visual Change**	
iv	3% Detergent Solution ($38^{O}C$ for 72hrs)		**No Visual Change**	
v	Mortar pat test	AAMA 2605	**No Visual Change**	
10	**WEATHER-O-METER TEST**	ASTM D2244		
i	GLOSS RETENTION		**70% after 4000 hrs**	
ii	COLOR RETENTION		**Max. 5 Units after 4000 hrs**	
iii	CHALK RESISTANCE		**Max. 8 Units after 4000 hrs**	
11	**Fire Properties**			
1	**Reaction To Fire**	BS476 Part 6&7		**Class O**

PRODUCT TOLERANCE : Panel Width: ± 2.0 mm; Panel Length: ± 4.0 mm; Panel Thickness: ± 0.2mm; Maximum Squareness: 5.0 mm; Maximum Bow: 0.5% of width and/or length; Coil Thickness: 0.03mm Tolerance

ALUDECOR AL 63 TECHNICAL SPECIFICATION

Technical

SL.NO.	DESCRIPTION	STANDARD	UNIT	AL 63
A.	**PRODUCT DETAILS & THICKNESS**		mm	6
1	COVER SHEET THICKNESS		mm	0.25
2	ALLOY	ASTM B209 M		AA1100
3	CORE MATERIAL		**LDPE**	
B.	**ALLOY DESCRIPTION**	ASTM B209 M		H18
C.	**PHYSICAL PROPERTIES (For ACM)**			
1	WEIGHT	ASTM D592	Kg/m^2	7
2	WATER ABSORPTION	ASTM C272	%	NIL
3	COEFFICIENT OF THERMAL EXPANSION-α	ASTM D696	$^{O}/C$	24.0×10^{-6}
D.	**MECHANICAL PROPERTIES**			
	ALUMINIUM SKIN			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	Min. 130
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	Min. 120
3	ELONGATION	ASTM E8	%	3
4	MODULUS OF ELASTICITY	ASTM E8	$Mpa(N/mm^2)$	> 68000
5	SURFACE RESISTIVITY (STATIC CHARGE)	ASTM D257	Ω	1.6×10^{12}
E.	**ALUMINIUM COMPOSITE PANEL**			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	19.5
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	15
4	BOND INTEGRITY (PEEL STRENGTH)	ASTM D903	N/mm	Min. 7
5	ELONGATION	ASTM E8	%	5
6	SOUND TRANSMISSION CLASS	ASTM E 413	dB	26
F.	**COATING DETAILS**			
1	**COATING TYPE**	AAMA 2605	**PVDF/Lumiflon resin based Flurocarbon Coating**	
2	**COATING THICKNESS**	AAMA 2605	**25-28µ**	
3	**GLOSS (60^{O})**	ASTM D523	%	**5-20**
4	**FORMABILITY (T-Bend)**	ASTM D1737	T	**2T**
5	**REVERSE IMPACT- CROSSHATCH**	NCCA II-5		**No Pick Up**
6	**PENCIL HARDNESS**	ASTM D3363	min	**3H**
7	**ADHESION**	ASTM D3359		
i	DRY	METHOD 8		**No Pick Up**
ii	WET	$37.8^{O}C$, 24hrs		**No Pick Up**
iii	BOILING WATER	$100^{O}C$, 20min		**No Pick Up**
8	**ABRASION RESISTANCE**	ASTM D968	Litres/Millilitres	**40**
9	**CHEMICAL RESISTANCE TEST**	ASTM D543		
i	10% HCL (1hrs)		**No Visual Change**	
ii	20% H_2SO_4 (72hrs)		**No Visual Change**	
iii	20% NaOH (18hrs)		**No Visual Change**	
iv	3% Detergent Solution ($38^{O}C$ for 72hrs)		**No Visual Change**	
v	Mortar pat test	AAMA 2605	**No Visual Change**	
10	**WEATHER-O-METER TEST**	ASTM D2244		
i	GLOSS RETENTION		**70% after 4000 hrs**	
ii	COLOR RETENTION		**Max. 5 Units after 4000 hrs**	
iii	CHALK RESISTANCE		**Max. 8 Units after 4000 hrs**	

PRODUCT TOLERANCE : Panel Width: ± 2.0 mm; Panel Length: ± 4.0 mm; Panel Thickness: ± 0.2mm; Maximum Squareness: 5.0 mm; Maximum Bow: 0.5% of width and/or length; Coil Thickness: 0.03mm Tolerance

ALUDECOR AL 63 FireWall BS 476 Class O
TECHNICAL SPECIFICATION

SL.NO.	DESCRIPTION	STANDARD	UNIT	AL 63
A.	**PRODUCT DETAILS & THICKNESS**		mm	6
1	COVER SHEET THICKNESS		mm	0.25
2	ALLOY	ASTM B209 M		AA1100
3	CORE MATERIAL		**Mineral Core**	
B.	**ALLOY DESCRIPTION**	ASTM B209 M		H18
C.	**PHYSICAL PROPERTIES (For ACM)**			
1	WEIGHT	ASTM D592	Kg/m^2	8.8
2	WATER ABSORPTION	ASTM C272	%	NIL
3	COEFFICIENT OF THERMAL EXPANSION-α	ASTM D696	$^{O}/C$	24.0×10^{-6}
D.	**MECHANICAL PROPERTIES**			
	ALUMINIUM SKIN			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	Min. 130
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	Min. 120
3	ELONGATION	ASTM E8	%	Min. 3
4	MODULUS OF ELASTICITY	ASTM E8	$Mpa(N/mm^2)$	> 68000
5	SURFACE RESISTIVITY (STATIC CHARGE)	ASTM D257	Ω	1.6×10^{12}
E.	**ALUMINIUM COMPOSITE PANEL**			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	19.5
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	15
4	BOND INTEGRITY (PEEL STRENGTH)	ASTM D903	N/mm	Min. 7
5	ELONGATION	ASTM E8	%	5
6	SOUND TRANSMISSION CLASS	ASTM E 413	dB	26
F.	**COATING DETAILS**			
1	**COATING TYPE**	AAMA 2605	**PVDF/Lumiflon resin based Flurocarbon Coating**	
2	**COATING THICKNESS**	AAMA 2605	**25-30µ**	
3	**GLOSS (60^{O})**	ASTM D523	%	**5-20**
4	**FORMABILITY (T-Bend)**	ASTM D1737	T	**2T**
5	**REVERSE IMPACT- CROSSHATCH**	NCCA II-5		**No Pick Up**
6	**PENCIL HARDNESS**	ASTM D3363	min	**3H**
7	**ADHESION**	ASTM D3359		
i	DRY	METHOD 8		**No Pick Up**
ii	WET	$37.8^{O}C$, 24hrs		**No Pick Up**
iii	BOILING WATER	$100^{O}C$, 20min		**No Pick Up**
8	**ABRASION RESISTANCE**	ASTM D968	Litres/Millilitres	**40**
9	**CHEMICAL RESISTANCE TEST**	ASTM D543		
i	10% HCL (1hrs)		**No Visual Change**	
ii	20% H_2SO_4 (72hrs)		**No Visual Change**	
iii	20% NaOH (18hrs)		**No Visual Change**	
iv	3% Detergent Solution ($38^{O}C$ for 72hrs)		**No Visual Change**	
v	Mortar pat test	AAMA 2605	**No Visual Change**	
10	**WEATHER-O-METER TEST**	ASTM D2244		
i	GLOSS RETENTION		**70% after 4000 hrs**	
ii	COLOR RETENTION		**Max. 5 Units after 4000 hrs**	
iii	CHALK RESISTANCE		**Max. 8 Units after 4000 hrs**	
G.	**Fire Properties**			
1	**Reaction To Fire**	BS476 Part 6&7		**Class O**

PRODUCT TOLERANCE : Panel Width: ± 2.0 mm; Panel Length: ± 4.0 mm; Panel Thickness: ± 0.2mm; Maximum Squareness: 5.0 mm; Maximum Bow: 0.5% of width and/or length; Coil Thickness: 0.03mm Tolerance

ALUDECOR AL 45 FireWall EN 13501-1 Class B TECHNICAL SPECIFICATION

SL.NO.	DESCRIPTION	STANDARD	UNIT	AL 45 Class B
A.	PRODUCT DETAILS & THICKNESS		mm	4
1	COVER SHEET THICKNESS		mm	0.5
2	ALLOY	ASTM B209 M		AA3105/5005
3	CORE MATERIAL		Mineral Core	
B.	ALLOY DESCRIPTION	ASTM B209 M		H14/ H16/ H24
C.	PHYSICAL PROPERTIES (For ACM)			
1	WEIGHT	ASTM D592	Kg/m^2	7.6
2	COEFFICIENT OF THERMAL EXPANSION-α	ASTM D696	$^{o}/C$	24.0×10^{-6}
D.	MECHANICAL PROPERTIES			
	ALUMINIUM SKIN			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	Min. 145
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	Min. 120
3	ELONGATION	ASTM E8	%	Min. 3
4	MODULUS OF ELASTICITY	ASTM E8	$Mpa(N/mm^2)$	> 68000
5	SURFACE RESISTIVITY (STATIC CHARGE)	ASTM D257	Ω	1.6×10^{12}
E.	ALUMINIUM COMPOSITE PANEL			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	50
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	45
3	BOND INTEGRITY (PEEL STRENGTH)	ASTM D903	N/mm	9
4	ELONGATION	ASTM E8	%	3
5	FLEXURAL STRENGTH	ASTM D790	$Mpa(N/mm^2)$	116
6	FLEXURAL STIFFNESS/RIGIDITY	ASTM D790	$Mpa(N/mm^2)$	14034
7	SHEAR STRENGTH	ASTM D732	$Mpa(N/mm^2)$	18
8	SOUND TRANSMISSION CLASS	ASTM E 413	dB	26
F.	COATING DETAILS			
1	COATING TYPE	AAMA 2605	PVDF/Lumiflon resin based Flurocarbon Coating	
2	COATING THICKNESS	AAMA 2605	25-28µ (For Two Coat) 30-35µ (For Three Coat)	
3	GLOSS (60^{o})	ASTM D523	%	15-60
4	FORMABILITY (T-Bend)	ASTM D1737	T	2T
5	REVERSE IMPACT- CROSSHATCH	NCCA II-5		No Pick Up
6	PENCIL HARDNESS	ASTM D3363	min	H
7	ADHESION	ASTM D3359		
i	DRY	METHOD 8		No Pick Up
ii	WET	$37.8^{o}C$, 24hrs		No Pick Up
iii	BOILING WATER	$100^{o}C$, 20min		No Pick Up
8	ABRASION RESISTANCE	ASTM D968	Litres/Millilitres	40
9	CHEMICAL RESISTANCE TEST	ASTM D543		
i	10% HCL (1hrs)		No Visual Change	
ii	20% H_2SO_4 (72hrs)		No Visual Change	
iii	20% NaOH (18hrs)		No Visual Change	
iv	3% Detergent Solution ($38^{o}C$ for 72hrs)		No Visual Change	
v	Mortar pat test	AAMA 2605	No Visual Change	
10	WEATHER-O-METER TEST	ASTM D2244		

Technical

ALUDECOR AL 45 FireWall EN 13501-1 Class B TECHNICAL SPECIFICATION

SL.NO.	DESCRIPTION	STANDARD	UNIT	AL 45 Class B
i	GLOSS RETENTION		70% after 4000 hrs	
ii	COLOR RETENTION		Max. 5 Units after 4000 hrs	
iii	CHALK RESISTANCE		Max. 8 Units after 4000 hrs	
G.	Fire Properties			
	Reaction To Fire	EN13501-1		Class B S1 D0
	Resistance To Fire	ASTM E119-12		2 Hrs

PRODUCT TOLERANCE : Panel Width: + 2.0 mm; Panel Length: + 4.0 mm; Panel Thickness: + 0.2mm; Maximum Squareness: 5.0 mm; Maximum Bow: 0.5% of width and/or length; Coil Thickness: 0.03mm Tolerance

AludecoR
Metal Composite Panel

ALUDECOR AL 45 FireWall EN 13501-1 Class A2 TECHNICAL SPECIFICATION

SL.NO.	DESCRIPTION	STANDARD	UNIT	AL 45 Class A2
A.	PRODUCT DETAILS & THICKNESS		mm	4
1	COVER SHEET THICKNESS		mm	0.5
2	ALLOY	ASTM B209 M		AA5005
3	CORE MATERIAL		Mineral Core	
B.	ALLOY DESCRIPTION	ASTM B209 M		H22/ H24
C.	PHYSICAL PROPERTIES (For ACM)			
1	WEIGHT	ASTM D592	Kg/m^2	8.1
2	COEFFICIENT OF THERMAL EXPANSION-α	ASTM D696	°/C	24.0×10^{-6}
D.	MECHANICAL PROPERTIES			
	ALUMINIUM SKIN			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	Min. 150
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	Min. 125
3	ELONGATION	ASTM E8	%	Min. 3
4	MODULUS OF ELASTICITY	ASTM E8	$Mpa(N/mm^2)$	> 68000
5	SURFACE RESISTIVITY (STATIC CHARGE)	ASTM D257	Ω	1.6×10^{12}
E.	ALUMINIUM COMPOSITE PANEL			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	50
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	45
3	BOND INTEGRITY (PEEL STRENGTH)	ASTM D903	N/mm	9
4	ELONGATION	ASTM E8	%	3
5	FLEXURAL STRENGTH	ASTM D790	$Mpa(N/mm^2)$	116
6	FLEXURAL STIFFNESS/RIGIDITY	ASTM D790	$Mpa(N/mm^2)$	14034
7	SHEAR STRENGTH	ASTM D732	$Mpa(N/mm^2)$	18
8	SOUND TRANSMISSION CLASS	ASTM E 413	dB	26
F.	COATING DETAILS			
1	COATING TYPE	AAMA 2605	PVDF/Lumiflon resin based Flurocarbon Coating	
2	COATING THICKNESS	AAMA 2605	25-28µ (For Two Coat) 30-35µ (For Three Coat)	
3	GLOSS (60°)	ASTM D523	%	15-60
4	FORMABILITY (T-Bend)	ASTM D1737	T	2T
5	REVERSE IMPACT- CROSSHATCH	NCCA II-5		No Pick Up
6	PENCIL HARDNESS	ASTM D3363	min	H
7	ADHESION	ASTM D3359		
i	DRY	METHOD 8		No Pick Up
ii	WET	37.8°C, 24hrs		No Pick Up
iii	BOILING WATER	100°C, 20min		No Pick Up
8	ABRASION RESISTANCE	ASTM D968	Litres/Millilitres	40
9	CHEMICAL RESISTANCE TEST	ASTM D543		
i	10% HCL (1hrs)		No Visual Change	
ii	20% H_2SO_4 (72hrs)		No Visual Change	
iii	20% NaOH (18hrs)		No Visual Change	
iv	3% Detergent Solution (38°C for 72hrs)		No Visual Change	
v	Mortar pat test	AAMA 2605	No Visual Change	
10	WEATHER-O-METER TEST	ASTM D2244		
i	GLOSS RETENTION		70% after 4000 hrs	
ii	COLOR RETENTION		Max. 5 Units after 4000 hrs	
iii	CHALK RESISTANCE		Max. 8 Units after 4000 hrs	
G.	Fire Properties			
	Reaction To Fire	EN13501-1		Class A2 S1 D0

PRODUCT TOLERANCE : Panel Width: + 2.0 mm; Panel Length: + 4.0 mm; Panel Thickness: + 0.2mm; Maximum Squareness: 5.0 mm; Maximum Bow: 0.5% of width and/or length; Coil Thickness: 0.03mm Tolerance

Technical

ALUDECOR AL 45 FireWall BS 476 Class O
TECHNICAL SPECIFICATION

SL.NO.	DESCRIPTION	STANDARD	UNIT	AL 45
A.	**PRODUCT DETAILS & THICKNESS**		mm	4
1	COVER SHEET THICKNESS		mm	0.5
2	ALLOY	ASTM B209 M		AA3105/5005
3	CORE MATERIAL		**Mineral Core**	
B.	**ALLOY DESCRIPTION**	ASTM B209 M		H14/ H16/ H24
C.	**PHYSICAL PROPERTIES (For ACM)**			
1	WEIGHT	ASTM D592	Kg/m^2	7
2	WATER ABSORPTION	ASTM C272	%	NIL
3	COEFFICIENT OF THERMAL EXPANSION-α	ASTM D696	$^{O}/C$	24.0×10^{-6}
D.	**MECHANICAL PROPERTIES**			
	ALUMINIUM SKIN			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	Min. 145
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	Min. 120
3	ELONGATION	ASTM E8	%	Min. 3
4	MODULUS OF ELASTICITY	ASTM E8	$Mpa(N/mm^2)$	> 68000
5	SURFACE RESISTIVITY (STATIC CHARGE)	ASTM D257	Ω	1.6×10^{12}
E.	**ALUMINIUM COMPOSITE PANEL**			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	45
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	40
4	BOND INTEGRITY (PEEL STRENGTH)	ASTM D903	N/mm	Min. 7
5	ELONGATION	ASTM E8	%	5
5	FLEXURAL STRENGTH	ASTM D790	$Mpa(N/mm^2)$	116
6	FLEXURAL STIFFNESS/RIGIDITY	ASTM D790	$Mpa(N/mm^2)$	14034
7	SHEAR STRENGTH	ASTM D732	$Mpa(N/mm^2)$	18
8	SOUND TRANSMISSION CLASS	ASTM E 413	dB	26
F.	**COATING DETAILS**			
1	**COATING TYPE**	AAMA 2605	**PVDF/Lumiflon resin based Flurocarbon Coating**	
2	**COATING THICKNESS**	AAMA 2605	**25-28µ (For Two Coat) 30-35µ (For Three Coat)**	
3	**GLOSS (60^{O})**	ASTM D523	%	**15-60**
4	**FORMABILITY (T-Bend)**	ASTM D1737	T	**2T**
5	**REVERSE IMPACT- CROSSHATCH**	NCCA II-5		**No Pick Up**
6	**PENCIL HARDNESS**	ASTM D3363	min	**H**
7	**ADHESION**	ASTM D3359		
i	DRY	METHOD 8		**No Pick Up**
ii	WET	$37.8^{O}C$, 24hrs		**No Pick Up**
iii	BOILING WATER	$100^{O}C$, 20min		**No Pick Up**
8	**ABRASION RESISTANCE**	ASTM D968	Litres/Millilitres	**40**
9	**CHEMICAL RESISTANCE TEST**	ASTM D543		
i	10% HCL (1hrs)		**No Visual Change**	
ii	20% H_2SO_4 (72hrs)		**No Visual Change**	
iii	20% NaOH (18hrs)		**No Visual Change**	
iv	3% Detergent Solution ($38^{O}C$ for 72hrs)		**No Visual Change**	
v	Mortar pat test	AAMA 2605	**No Visual Change**	
10	**WEATHER-O-METER TEST**	ASTM D2244		
i	GLOSS RETENTION		**70% after 4000 hrs**	
ii	COLOR RETENTION		**Max. 5 Units after 4000 hrs**	
iii	CHALK RESISTANCE		**Max. 8 Units after 4000 hrs**	
G.	**Fire Properties**			
1	**Reaction To Fire**	BS476 Part 6&7		**Class O**

PRODUCT TOLERANCE : Panel Width: ± 2.0 mm; Panel Length: ± 4.0 mm; Panel Thickness: ± 0.2mm; Maximum Squareness: 5.0 mm; Maximum Bow: 0.5% of width and/or length; Coil Thickness: 0.03mm Tolerance

AludecoR
Metal Composite Panel

ALUDECOR AL 45 (Select) TECHNICAL SPECIFICATION

Technical

SL.NO.	DESCRIPTION	STANDARD	UNIT	AL 45
A.	**PRODUCT DETAILS & THICKNESS**		mm	4
1	COVER SHEET THICKNESS		mm	0.5
2	ALLOY	ASTM B209 M		AA3105/5005
3	CORE MATERIAL		**LDPE**	
B.	**ALLOY DESCRIPTION**	ASTM B209 M		H14/ H16/ H24
C.	**PHYSICAL PROPERTIES (For ACM)**			
1	WEIGHT	ASTM D592	Kg/m^2	5.5
2	WATER ABSORPTION	ASTM C272	%	NIL
3	COEFFICIENT OF THERMAL EXPANSION-α	ASTM D696	$^{O}/C$	24.0×10^{-6}
D.	**MECHANICAL PROPERTIES**			
	ALUMINIUM SKIN			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	Min. 145
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	Min. 120
3	ELONGATION	ASTM E8	%	Min. 3
4	MODULUS OF ELASTICITY	ASTM E8	$Mpa(N/mm^2)$	> 68000
5	SURFACE RESISTIVITY (STATIC CHARGE)	ASTM D257	Ω	1.6×10^{12}
E.	**ALUMINIUM COMPOSITE PANEL**			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	45
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	40
3	BOND INTEGRITY (PEEL STRENGTH)	ASTM D903	N/mm	Min. 7
4	ELONGATION	ASTM E8	%	5
5	FLEXURAL STRENGTH	ASTM D790	$Mpa(N/mm^2)$	116
6	FLEXURAL STIFFNESS/RIGIDITY	ASTM D790	$Mpa(N/mm^2)$	14034
7	SHEAR STRENGTH	ASTM D732	$Mpa(N/mm^2)$	18
8	SOUND TRANSMISSION CLASS	ASTM E 413	dB	26
F.	**COATING DETAILS**			
1	**COATING TYPE**	AAMA 2605	**PVDF/Lumiflon resin based Flurocarbon Coating**	
2	**COATING THICKNESS**	AAMA 2605	**25-28µ (For Two Coat) 30-35µ (For Three Coat)**	
3	**GLOSS (60^{O})**	ASTM D523	%	**15-60**
4	**FORMABILITY (T-Bend)**	ASTM D1737	T	**2T**
5	**REVERSE IMPACT- CROSSHATCH**	NCCA II-5		**No Pick Up**
6	**PENCIL HARDNESS**	ASTM D3363	min	**H**
7	**ADHESION**	ASTM D3359		
i	DRY	METHOD 8		**No Pick Up**
ii	WET	$37.8^{O}C$, 24hrs		**No Pick Up**
iii	BOILING WATER	$100^{O}C$, 20min		**No Pick Up**
8	**ABRASION RESISTANCE**	ASTM D968	Litres/Millilitres	**40**
9	**CHEMICAL RESISTANCE TEST**	ASTM D543		
i	10% HCL (1hrs)		**No Visual Change**	
ii	20% H_2SO_4 (72hrs)		**No Visual Change**	
iii	20% NaOH (18hrs)		**No Visual Change**	
iv	3% Detergent Solution ($38^{O}C$ for 72hrs)		**No Visual Change**	
v	Mortar pat test	AAMA 2605	**No Visual Change**	
10	**WEATHER-O-METER TEST**	ASTM D2244		
i	GLOSS RETENTION		**70% after 4000 hrs**	
ii	COLOR RETENTION		**Max. 5 Units after 4000 hrs**	
iii	CHALK RESISTANCE		**Max. 8 Units after 4000 hrs**	

PRODUCT TOLERANCE : Panel Width: ± 2.0 mm; Panel Length: ± 4.0 mm; Panel Thickness: ± 0.2mm; Maximum Squareness: 5.0 mm; Maximum Bow: 0.5% of width and/or length; Coil Thickness: 0.03mm Tolerance

ALUDECOR AL 45 (Masterwork) TECHNICAL SPECIFICATION

SL.NO.	DESCRIPTION	STANDARD	UNIT	AL 45
A.	**PRODUCT DETAILS & THICKNESS**		mm	4
1	COVER SHEET THICKNESS		mm	0.5
2	ALLOY	ASTM B209 M		AA3105/5005
3	CORE MATERIAL		**Virgin LDPE**	
B.	**ALLOY DESCRIPTION**	ASTM B209 M		H14/ H16/ H24
C.	**PHYSICAL PROPERTIES (For ACM)**			
1	WEIGHT	ASTM D592	Kg/m^2	5.5
2	WATER ABSORPTION	ASTM C272	%	NIL
3	COEFFICIENT OF THERMAL EXPANSION-α	ASTM D696	$^{O}/C$	24.0×10^{-6}
D.	**MECHANICAL PROPERTIES**			
	ALUMINIUM SKIN			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	Min. 145
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	Min. 120
3	ELONGATION	ASTM E8	%	5
4	MODULUS OF ELASTICITY	ASTM E8	$Mpa(N/mm^2)$	> 68000
5	SURFACE RESISTIVITY (STATIC CHARGE)	ASTM D257	Ω	1.6×10^{12}
E.	**ALUMINIUM COMPOSITE PANEL**			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	45
2	TENSILE YEILD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	40
3	BOND INTERGITY (PEEL STRENGTH)	ASTM D903	N/mm	Min. 7
4	ELONGATION	ASTM E8	%	7
5	FLEXURAL STRENGTH	ASTM D790	$Mpa(N/mm^2)$	116
6	FLEXURAL STIFFNESS/RIGIDITY	ASTM D790	$Mpa(N/mm^2)$	14034
7	SHEAR STRENGTH	ASTM D732	$Mpa(N/mm^2)$	18
8	SOUND TRANSMISSION CLASS	ASTM E 413	dB	26
F.	**COATING DETAILS**			
1	**COATING TYPE**	AAMA 2605	**PVDF/Lumiflon resin based Flurocarbon Coating**	
2	**COATING THICKNESS**	AAMA 2605	**25-28µ (For Two Coat) 30-35µ (For Three Coat)**	
3	**GLOSS (60^{O})**	ASTM D523	%	**15-60**
4	**FORMABILITY (T-Bend)**	ASTM D1737	T	**2T**
5	**REVERSE IMPACT- CROSSHATCH**	NCCA II-5		**No Pick Up**
6	**PENCIL HARDNESS**	ASTM D3363	min	**H**
7	**ADHESION**	ASTM D3359		
i	DRY	METHOD 8		**No Pick Up**
ii	WET	$37.8^{O}C$, 24hrs		**No Pick Up**
iii	BOILING WATER	$100^{O}C$, 20min		**No Pick Up**
8	**ABRASION RESISTANCE**	ASTM D968	Litres/Millilitres	**40**
9	**CHEMICAL RESISTANCE TEST**	ASTM D543		
i	10% HCL (1hrs)		**No Visual Change**	
ii	20% H_2SO_4 (72hrs)		**No Visual Change**	
iii	20% NaOH (18hrs)		**No Visual Change**	
iv	3% Detergent Solution ($38^{O}C$ for 72hrs)		**No Visual Change**	
v	Mortar pat test	AAMA 2605	**No Visual Change**	
10	**WEATHER-O-METER TEST**	ASTM D2244		
i	GLOSS RETENTION		**70% after 4000 hrs**	
ii	COLOR RETENTION		**Max. 5 Units after 4000 hrs**	
iii	CHALK RESISTANCE		**Max. 8 Units after 4000 hrs**	

PRODUCT TOLERANCE : Panel Width: ± 2.0 mm; Panel Length: ± 4.0 mm; Panel Thickness: ± 0.2mm; Maximum Squareness: 5.0 mm; Maximum Bow: 0.5% of width and/or length; Coil Thickness: 0.03mm Tolerance

ALUDECOR AL 45D TECHNICAL SPECIFICATION

SL.NO.	DESCRIPTION	STANDARD	UNIT	AL 45D
A.	**PRODUCT DETAILS & THICKNESS**		mm	4
1	COVER SHEET THICKNESS		mm	0.5
2	ALLOY	ASTM B209 M		AA5005
3	CORE MATERIAL		**Virgin LDPE**	
B.	**ALLOY DESCRIPTION**	ASTM B209 M		H24
C.	**PHYSICAL PROPERTIES (For ACM)**			
1	WEIGHT	ASTM D592	Kg/m^2	5.5
2	WATER ABSORPTION	ASTM C272	%	NIL
3	COEFFICIENT OF THERMAL EXPANSION-α	ASTM D696	$^{O}/C$	24.0×10^{-6}
D.	**MECHANICAL PROPERTIES**			
	ALUMINIUM SKIN			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	Min. 150
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	Min. 135
3	ELONGATION	ASTM E8	%	5
4	MODULUS OF ELASTICITY	ASTM E8	$Mpa(N/mm^2)$	> 68000
5	SURFACE RESISTIVITY (STATIC CHARGE)	ASTM D257	Ω	1.6×10^{12}
E.	**ALUMINIUM COMPOSITE PANEL**			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	48
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	40
3	BOND INTEGRITY (PEEL STRENGTH)	ASTM D903	N/mm	7
4	ELONGATION	ASTM E8	%	5
5	FLEXURAL STRENGTH	ASTM D790	$Mpa(N/mm^2)$	116
6	FLEXURAL STIFFNESS/RIGIDITY	ASTM D790	$Mpa(N/mm^2)$	14034
7	SHEAR STRENGTH	ASTM D732	$Mpa(N/mm^2)$	18
8	SOUND TRANSMISSION CLASS	ASTM E 413	dB	26
F.	**COATING DETAILS**			
1	**COATING TYPE**	AAMA 2605	**PVDF/Lumiflon resin based Flurocarbon Coating**	
2	**COATING THICKNESS**	AAMA 2605	**30-35µ (For Three Coat)**	
3	**GLOSS (60^{O})**	ASTM D523	%	**15-60**
4	**FORMABILITY (T-Bend)**	ASTM D1737	T	**2T**
5	**REVERSE IMPACT- CROSSHATCH**	NCCA II-5		**No Pick Up**
6	**PENCIL HARDNESS**	ASTM D3363	min	**H**
7	**ADHESION**	ASTM D3359		
i	DRY	METHOD 8		**No Pick Up**
ii	WET	$37.8^{O}C$, 24hrs		**No Pick Up**
iii	BOILING WATER	$100^{O}C$, 20min		**No Pick Up**
8	**ABRASION RESISTANCE**	ASTM D968	Litres/Millilitres	**40**
9	**CHEMICAL RESISTANCE TEST**	ASTM D543		
i	10% HCL (1hrs)		**No Visual Change**	
ii	20% H_2SO_4 (72hrs)		**No Visual Change**	
iii	20% NaOH (18hrs)		**No Visual Change**	
iv	3% Detergent Solution ($38^{O}C$ for 72hrs)		**No Visual Change**	
v	Mortar pat test	AAMA 2605	**No Visual Change**	
10	**WEATHER-O-METER TEST**	ASTM D2244		
i	GLOSS RETENTION		**70% after 4000 hrs**	
ii	COLOR RETENTION		**Max. 5 Units after 4000 hrs**	
iii	CHALK RESISTANCE		**Max. 8 Units after 4000 hrs**	

PRODUCT TOLERANCE : Panel Width: ± 2.0 mm; Panel Length: ± 4.0 mm; Panel Thickness: ± 0.2mm; Maximum Squareness: 5.0 mm; Maximum Bow: 0.5% of width and/or length; Coil Thickness: 0.03mm Tolerance

Technical

ALUDECOR AL 43 TECHNICAL SPECIFICATION

SL.NO.	DESCRIPTION	STANDARD	UNIT	AL 43
A.	**PRODUCT DETAILS & THICKNESS**		mm	4
1	COVER SHEET THICKNESS		mm	0.25
2	ALLOY	ASTM B209 M		AA1100
3	CORE MATERIAL		**LDPE**	
B.	**ALLOY DESCRIPTION**	ASTM B209 M		H18
C.	**PHYSICAL PROPERTIES (For ACM)**			
1	WEIGHT	ASTM D592	Kg/m^2	4.88
2	WATER ABSORPTION	ASTM C272	%	NIL
3	COEFFICIENT OF THERMAL EXPANSION-α	ASTM D696	$^{O}/C$	24.0×10^{-6}
D.	**MECHANICAL PROPERTIES**			
	ALUMINIUM SKIN			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	Min. 130
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	Min. 120
3	ELONGATION	ASTM E8	%	3
4	MODULUS OF ELASTICITY	ASTM E8	$Mpa(N/mm^2)$	> 68000
5	SURFACE RESISTIVITY (STATIC CHARGE)	ASTM D257	Ω	1.6×10^{12}
E.	**ALUMINIUM COMPOSITE PANEL**			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	21
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	18
3	BOND INTEGRITY (PEEL STRENGTH)	ASTM D903	N/mm	Min. 5
4	ELONGATION	ASTM E8	%	5
5	SOUND TRANSMISSION CLASS	ASTM E 413	dB	26
F.	**COATING DETAILS**			
1	**COATING TYPE**	AAMA 2605	**UV Resistant based Coating/PVDF**	
2	**COATING THICKNESS**	AAMA 2605	**25-28µ (For Two Coat)**	
3	**GLOSS (60^{O})**	ASTM D523	%	**15-60**
4	**FORMABILITY (T-Bend)**	ASTM D1737	T	**2T**
5	**REVERSE IMPACT- CROSSHATCH**	NCCA II-5		**No Pick Up**
6	**PENCIL HARDNESS**	ASTM D3363	min	**H**
7	**ADHESION**	ASTM D3359		
i	DRY	METHOD 8		**No Pick Up**
ii	WET	$37.8^{O}C$, 24hrs		**No Pick Up**
iii	BOILING WATER	$100^{O}C$, 20min		**No Pick Up**
8	**ABRASION RESISTANCE**	ASTM D968	Litres/Millilitres	**40**
9	**CHEMICAL RESISTANCE TEST**	ASTM D543		
i	10% HCL (1hrs)		**No Visual Change**	
ii	20% H_2SO_4 (72hrs)		**No Visual Change**	
iii	20% NaOH (18hrs)		**No Visual Change**	
iv	3% Detergent Solution ($38^{O}C$ for 72hrs)		**No Visual Change**	
v	Mortar pat test	AAMA 2605	**No Visual Change**	
10	**WEATHER-O-METER TEST**	ASTM D2244		
i	GLOSS RETENTION		**60% after 2000 hrs**	
ii	COLOR RETENTION		**Max. 7 Units after 2000 hrs**	
iii	CHALK RESISTANCE		**Max. 8 Units after 2 000 hrs**	

PRODUCT TOLERANCE : Panel Width: ± 2.0 mm; Panel Length: ± 4.0 mm; Panel Thickness: ± 0.2mm; Maximum Squareness: 5.0 mm; Maximum Bow: 0.8% of width and/or length; Coil Thickness: 0.03mm Tolerance

AludecoR
Metal Composite Panel

ALUDECOR AL 43D TECHNICAL SPECIFICATION

Technical

SL.NO.	DESCRIPTION	STANDARD	UNIT	AL 43D
A.	**PRODUCT DETAILS & THICKNESS**		mm	4
1	COVER SHEET THICKNESS		mm	0.3
2	ALLOY	ASTM B209 M		AA3105
3	CORE MATERIAL		**LDPE**	
B.	**ALLOY DESCRIPTION**	ASTM B209 M		H14
C.	**PHYSICAL PROPERTIES (For ACM)**			
1	WEIGHT	ASTM D592	Kg/m^2	5.1
2	WATER ABSORPTION	ASTM C272	%	NIL
3	COEFFICIENT OF THERMAL EXPANSION-α	ASTM D696	$^{O}/C$	24.0×10^{-6}
D.	**MECHANICAL PROPERTIES**			
	ALUMINIUM SKIN			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	Min. 145
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	Min. 120
3	ELONGATION	ASTM E8	%	5
4	MODULUS OF ELASTICITY	ASTM E8	$Mpa(N/mm^2)$	> 68000
5	SURFACE RESISTIVITY (STATIC CHARGE)	ASTM D257	Ω	1.6×10^{12}
E.	**ALUMINIUM COMPOSITE PANEL**			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	36
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	26
3	BOND INTEGRITY (PEEL STRENGTH)	ASTM D903	N/mm	7
4	ELONGATION	ASTM E8	%	5
5	SOUND TRANSMISSION CLASS	ASTM E 413	dB	26
F.	**COATING DETAILS**			
1	**COATING TYPE**	AAMA 2605	**PVDF/Lumiflon resin based Flurocarbon Coating**	
2	**COATING THICKNESS**	AAMA 2605	**25-28µ (For Two Coat) 30-35µ (For Three Coat)**	
3	**GLOSS (60^{O})**	ASTM D523	%	**15-60**
4	**FORMABILITY (T-Bend)**	ASTM D1737	T	**2T**
5	**REVERSE IMPACT- CROSSHATCH**	NCCA II-5		**No Pick Up**
6	**PENCIL HARDNESS**	ASTM D3363	min	**H**
7	**ADHESION**	ASTM D3359		
i	DRY	METHOD 8		**No Pick Up**
ii	WET	$37.8^{O}C$, 24hrs		**No Pick Up**
iii	BOILING WATER	$100^{O}C$, 20min		**No Pick Up**
8	**ABRASION RESISTANCE**	ASTM D968	Litres/Millilitres	**40**
9	**CHEMICAL RESISTANCE TEST**	ASTM D543		
i	10% HCL (1hrs)		**No Visual Change**	
ii	20% H_2SO_4 (72hrs)		**No Visual Change**	
iii	20% NaOH (18hrs)		**No Visual Change**	
iv	3% Detergent Solution ($38^{O}C$ for 72hrs)		**No Visual Change**	
v	Mortar pat test	AAMA 2605	**No Visual Change**	
10	**WEATHER-O-METER TEST**	ASTM D2244		
i	GLOSS RETENTION		**70% after 4000 hrs**	
ii	COLOR RETENTION		**Max. 5 Units after 4000 hrs**	
iii	CHALK RESISTANCE		**Max. 8 Units after 4000 hrs**	

PRODUCT TOLERANCE : Panel Width: ± 2.0 mm; Panel Length: ± 4.0 mm; Panel Thickness: ± 0.2mm; Maximum Squareness: 5.0 mm; Maximum Bow: 0.5% of width and/or length; Coil Thickness: 0.03mm Tolerance

ALUDECOR AL 43D FireWall EN 13501-1 Class B TECHNICAL SPECIFICATION

SL.NO.	DESCRIPTION	STANDARD	UNIT	AL 43D FR
A.	**PRODUCT DETAILS & THICKNESS**		mm	4
1	COVER SHEET THICKNESS		mm	0.3
2	ALLOY	ASTM B209 M		AA3105
3	CORE MATERIAL		**Mineral Core**	
B.	**ALLOY DESCRIPTION**	ASTM B209 M		H14
C.	**PHYSICAL PROPERTIES (For ACM)**			
1	WEIGHT	ASTM D592	Kg/m^2	6.95
2	WATER ABSORPTION	ASTM C272	%	NIL
3	COEFFICIENT OF THERMAL EXPANSION-α	ASTM D696	$^{O}/C$	24.0×10^{-6}
D.	**MECHANICAL PROPERTIES**			
	ALUMINIUM SKIN			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	Min. 145
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	Min. 120
3	ELONGATION	ASTM E8	%	5
4	MODULUS OF ELASTICITY	ASTM E8	$Mpa(N/mm^2)$	> 68000
5	SURFACE RESISTIVITY (STATIC CHARGE)	ASTM D257	Ω	1.6×10^{12}
E.	**ALUMINIUM COMPOSITE PANEL**			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	36
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	26
3	BOND INTEGRITY (PEEL STRENGTH)	ASTM D903	N/mm	7
4	ELONGATION	ASTM E8	%	5
5	SOUND TRANSMISSION CLASS	ASTM E 413	dB	26
F.	**COATING DETAILS**			
1	**COATING TYPE**	AAMA 2605	**PVDF/Lumiflon resin based Flurocarbon Coating**	
2	**COATING THICKNESS**	AAMA 2605	**25-28µ (For Two Coat) 30-35µ (For Three Coat)**	
3	**GLOSS (60^{O})**	ASTM D523	%	**15-60**
4	**FORMABILITY (T-Bend)**	ASTM D1737	T	**2T**
5	**REVERSE IMPACT- CROSSHATCH**	NCCA II-5		**No Pick Up**
6	**PENCIL HARDNESS**	ASTM D3363	min	**H**
7	**ADHESION**	ASTM D3359		
i	DRY	METHOD 8		**No Pick Up**
ii	WET	$37.8^{O}C$, 24hrs		**No Pick Up**
iii	BOILING WATER	$100^{O}C$, 20min		**No Pick Up**
8	**ABRASION RESISTANCE**	ASTM D968	Litres/Millilitres	**40**
9	**CHEMICAL RESISTANCE TEST**	ASTM D543		
i	10% HCL (1hrs)		**No Visual Change**	
ii	20% H_2SO_4 (72hrs)		**No Visual Change**	
iii	20% NaOH (18hrs)		**No Visual Change**	
iv	3% Detergent Solution ($38^{O}C$ for 72hrs)		**No Visual Change**	
v	Mortar pat test	AAMA 2605	**No Visual Change**	
10	**WEATHER-O-METER TEST**	ASTM D2244		
i	GLOSS RETENTION		**70% after 4000 hrs**	
ii	COLOR RETENTION		**Max. 5 Units after 4000 hrs**	
iii	CHALK RESISTANCE		**Max. 8 Units after 4000 hrs**	
G.	**Fire Properties**			
1	**Reaction To Fire**	EN13501-1		**Class B S1 D0**
2	**Resistance To Fire**	ASTM E119-12		**2 Hrs**

PRODUCT TOLERANCE : Panel Width: ± 2.0 mm; Panel Length: ± 4.0 mm; Panel Thickness: ± 0.2mm; Maximum Squareness: 5.0 mm; Maximum Bow: 0.5% of width and/or length; Coil Thickness: 0.03mm Tolerance

ALUDECOR AL 33 TECHNICAL SPECIFICATION

Technical

SL.NO.	DESCRIPTION	STANDARD	UNIT	AL 33
A.	**PRODUCT DETAILS & THICKNESS**		mm	3
1	COVER SHEET THICKNESS		mm	0.25
2	ALLOY	ASTM B209 M		AA1100
3	CORE MATERIAL		**LDPE**	
B.	**ALLOY DESCRIPTION**	ASTM B209 M		H18
C.	**PHYSICAL PROPERTIES (For ACM)**			
1	WEIGHT	ASTM D592	Kg/m^2	3.9
2	WATER ABSORPTION	ASTM C272	%	NIL
3	COEFFICIENT OF THERMAL EXPANSION-α	ASTM D696	$^{O}/C$	24.0×10^{-6}
D.	**MECHANICAL PROPERTIES**			
	ALUMINIUM SKIN			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	Min. 130
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	Min. 120
3	ELONGATION	ASTM E8	%	3
4	MODULUS OF ELASTICITY	ASTM E8	$Mpa(N/mm^2)$	> 68000
5	SURFACE RESISTIVITY (STATIC CHARGE)	ASTM D257	Ω	1.6×10^{12}
E.	**ALUMINIUM COMPOSITE PANEL**			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	20
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	16
3	BOND INTEGRITY (PEEL STRENGTH)	ASTM D903	N/mm	Min. 4
4	ELONGATION	ASTM E8	%	5
5	SOUND TRANSMISSION CLASS	ASTM E 413	dB	25
F.	**COATING DETAILS**			
1	**COATING TYPE**	AAMA 2605	**UV Resistant based Coating/PVDF**	
2	**COATING THICKNESS**	AAMA 2605	**25-28µ (For Two Coat)**	
3	**GLOSS (60^{O})**	ASTM D523	%	**15-60**
4	**FORMABILITY (T-Bend)**	ASTM D1737	T	**2T**
5	**REVERSE IMPACT- CROSSHATCH**	NCCA II-5		**No Pick Up**
6	**PENCIL HARDNESS**	ASTM D3363	min	**H**
7	**ADHESION**	ASTM D3359		
i	DRY	METHOD 8		**No Pick Up**
ii	WET	$37.8^{O}C$, 24hrs		**No Pick Up**
iii	BOILING WATER	$100^{O}C$, 20min		**No Pick Up**
8	**ABRASION RESISTANCE**	ASTM D968	Litres/Millilitres	**40**
9	**CHEMICAL RESISTANCE TEST**	ASTM D543		
i	10% HCL (1hrs)		**No Visual Change**	
ii	20% H_2SO_4 (72hrs)		**No Visual Change**	
iii	20% NaOH (18hrs)		**No Visual Change**	
iv	3% Detergent Solution ($38^{O}C$ for 72hrs)		**No Visual Change**	
v	Mortar pat test	AAMA 2605	**No Visual Change**	
10	**WEATHER-O-METER TEST**	ASTM D2244		
i	GLOSS RETENTION		**60% after 2000 hrs**	
ii	COLOR RETENTION		**Max. 7 Units after 2000 hrs**	
iii	CHALK RESISTANCE		**Max. 8 Units after 2000 hrs**	

PRODUCT TOLERANCE : Panel Width: ± 2.0 mm; Panel Length: ± 4.0 mm; Panel Thickness: ± 0.2mm; Maximum Squareness: 5.0 mm; Maximum Bow: 0.8% of width and/or length; Coil Thickness: 0.03mm Tolerance

ALUDECOR AL 33 FireWall BS 476 Class O TECHNICAL SPECIFICATION

SL.NO.	DESCRIPTION	STANDARD	UNIT	AL 33 FR
A.	**PRODUCT DETAILS & THICKNESS**		mm	3
1	COVER SHEET THICKNESS		mm	0.25
2	ALLOY	ASTM B209 M		AA1100
3	CORE MATERIAL		**Mineral Core**	
B.	**ALLOY DESCRIPTION**	ASTM B209 M		H18
C.	**PHYSICAL PROPERTIES (For ACM)**			
1	WEIGHT	ASTM D592	Kg/m^2	4.8
2	WATER ABSORPTION	ASTM C272	%	NIL
3	COEFFICIENT OF THERMAL EXPANSION-α	ASTM D696	$^{O}/C$	24.0×10^{-6}
D.	**MECHANICAL PROPERTIES**			
	ALUMINIUM SKIN			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	Min. 130
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	Min. 120
3	ELONGATION	ASTM E8	%	3
4	MODULUS OF ELASTICITY	ASTM E8	$Mpa(N/mm^2)$	> 68000
5	SURFACE RESISTIVITY (STATIC CHARGE)	ASTM D257	Ω	1.6×10^{12}
E.	**ALUMINIUM COMPOSITE PANEL**			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	20
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	16
3	BOND INTEGRITY (PEEL STRENGTH)	ASTM D903	N/mm	Min. 4
4	ELONGATION	ASTM E8	%	5
5	SOUND TRANSMISSION CLASS	ASTM E 413	dB	25
F.	**COATING DETAILS**			
1	**COATING TYPE**	AAMA 2605	**UV Resistant based Coating/PVDF**	
2	**COATING THICKNESS**	AAMA 2605	**25-28µ (For Two Coat)**	
3	**GLOSS (60^{O})**	ASTM D523	%	**15-60**
4	**FORMABILITY (T-Bend)**	ASTM D1737	T	**2T**
5	**REVERSE IMPACT- CROSSHATCH**	NCCA II-5		**No Pick Up**
6	**PENCIL HARDNESS**	ASTM D3363	min	**H**
7	**ADHESION**	ASTM D3359		
i	DRY	METHOD 8		**No Pick Up**
ii	WET	$37.8^{O}C$, 24hrs		**No Pick Up**
iii	BOILING WATER	$100^{O}C$, 20min		**No Pick Up**
8	**ABRASION RESISTANCE**	ASTM D968	Litres/Millilitres	**40**
9	**CHEMICAL RESISTANCE TEST**	ASTM D543		
i	10% HCL (1hrs)		**No Visual Change**	
ii	20% H_2SO_4 (72hrs)		**No Visual Change**	
iii	20% NaOH (18hrs)		**No Visual Change**	
iv	3% Detergent Solution ($38^{O}C$ for 72hrs)		**No Visual Change**	
v	Mortar pat test	AAMA 2605	**No Visual Change**	
10	**WEATHER-O-METER TEST**	ASTM D2244		
i	GLOSS RETENTION		**60% after 2000 hrs**	
ii	COLOR RETENTION		**Max. 7 Units after 2000 hrs**	
iii	CHALK RESISTANCE		**Max. 8 Units after 2000 hrs**	
G.	**Fire Properties**			
1	**Reaction To Fire**	BS476 Par 6 & 7		**Class O**
2	**Resistance To Fire**	ASTM E119		**2 Hrs**

PRODUCT TOLERANCE : Panel Width: ± 2.0 mm; Panel Length: ± 4.0 mm; Panel Thickness: ± 0.2mm; Maximum Squareness: 5.0 mm; Maximum Bow: 0.8% of width and/or length; Coil Thickness: 0.03mm Tolerance

AludecoR
Metal Composite Panel

ALUDECOR AL 33D TECHNICAL SPECIFICATION

Technical

SL.NO.	DESCRIPTION	STANDARD	UNIT	AL 33D
A.	**PRODUCT DETAILS & THICKNESS**		mm	3
1	COVER SHEET THICKNESS		mm	0.3
2	ALLOY	ASTM B209 M		AA3105
3	CORE MATERIAL		**LDPE**	
B.	**ALLOY DESCRIPTION**	ASTM B209 M		H14
C.	**PHYSICAL PROPERTIES (For ACM)**			
1	WEIGHT	ASTM D592	Kg/m^2	4.15
2	WATER ABSORPTION	ASTM C272	%	NIL
3	COEFFICIENT OF THERMAL EXPANSION-α	ASTM D696	$^{O}/C$	24.0×10^{-6}
D.	**MECHANICAL PROPERTIES**			
	ALUMINIUM SKIN			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	Min. 145
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	Min. 120
3	ELONGATION	ASTM E8	%	5
4	MODULUS OF ELASTICITY	ASTM E8	$Mpa(N/mm^2)$	> 68000
5	SURFACE RESISTIVITY (STATIC CHARGE)	ASTM D257	Ω	1.6×10^{12}
E.	**ALUMINIUM COMPOSITE PANEL**			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	35
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	25
3	BOND INTEGRITY (PEEL STRENGTH)	ASTM D903	N/mm	6
4	ELONGATION	ASTM E8	%	5
5	SOUND TRANSMISSION CLASS	ASTM E 413	dB	25
F.	**COATING DETAILS**			
1	**COATING TYPE**	AAMA 2605	**PVDF/Lumiflon resin based Flurocarbon Coating**	
2	**COATING THICKNESS**	AAMA 2605	**25-28µ (For Two Coat) 30-35µ (For Three Coat)**	
3	**GLOSS (60^{O})**	ASTM D523	%	**15-60**
4	**FORMABILITY (T-Bend)**	ASTM D1737	T	**2T**
5	**REVERSE IMPACT- CROSSHATCH**	NCCA II-5		**No Pick Up**
6	**PENCIL HARDNESS**	ASTM D3363	min	**H**
7	**ADHESION**	ASTM D3359		
i	DRY	METHOD 8		**No Pick Up**
ii	WET	$37.8^{O}C$, 24hrs		**No Pick Up**
iii	BOILING WATER	$100^{O}C$, 20min		**No Pick Up**
8	**ABRASION RESISTANCE**	ASTM D968	Litres/Millilitres	**40**
9	**CHEMICAL RESISTANCE TEST**	ASTM D543		
i	10% HCL (1hrs)		**No Visual Change**	
ii	20% H_2SO_4 (72hrs)		**No Visual Change**	
iii	20% NaOH (18hrs)		**No Visual Change**	
iv	3% Detergent Solution ($38^{O}C$ for 72hrs)		**No Visual Change**	
v	Mortar pat test	AAMA 2605	**No Visual Change**	
10	**WEATHER-O-METER TEST**	ASTM D2244		
i	GLOSS RETENTION		**70% after 4000 hrs**	
ii	COLOR RETENTION		**Max. 5 Units after 4000 hrs**	
iii	CHALK RESISTANCE		**Max. 8 Units after 4000 hrs**	

PRODUCT TOLERANCE : Panel Width: ± 2.0 mm; Panel Length: ± 4.0 mm; Panel Thickness: ± 0.2mm; Maximum Squareness: 5.0 mm; Maximum Bow: 0.5% of width and/or length; Coil Thickness: 0.03mm Tolerance

ALUDECOR AL 33D TECHNICAL SPECIFICATION

SL.NO.	DESCRIPTION	STANDARD	UNIT	AL 33D
A.	**PRODUCT DETAILS & THICKNESS**		mm	3
1	COVER SHEET THICKNESS		mm	0.3
2	ALLOY	ASTM B209 M		AA3105
3	CORE MATERIAL		**LDPE**	
B.	**ALLOY DESCRIPTION**	ASTM B209 M		H14
C.	**PHYSICAL PROPERTIES (For ACM)**			
1	WEIGHT	ASTM D592	Kg/m^2	5.5
2	WATER ABSORPTION	ASTM C272	%	NIL
3	COEFFICIENT OF THERMAL EXPANSION-α	ASTM D696	$^{O}/C$	24.0×10^{-6}
D.	**MECHANICAL PROPERTIES**			
	ALUMINIUM SKIN			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	Min. 145
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	Min. 120
3	ELONGATION	ASTM E8	%	5
4	MODULUS OF ELASTICITY	ASTM E8	$Mpa(N/mm^2)$	> 68000
5	SURFACE RESISTIVITY (STATIC CHARGE)	ASTM D257	Ω	1.6×10^{12}
E.	**ALUMINIUM COMPOSITE PANEL**			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	35
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	25
3	BOND INTEGRITY (PEEL STRENGTH)	ASTM D903	N/mm	6
4	ELONGATION	ASTM E8	%	5
5	SOUND TRANSMISSION CLASS	ASTM E 413	dB	25
F.	**COATING DETAILS**			
1	**COATING TYPE**	AAMA 2605	**PVDF/Lumiflon resin based Flurocarbon Coating**	
2	**COATING THICKNESS**	AAMA 2605	**25-28µ (For Two Coat) 30-35µ (For Three Coat)**	
3	**GLOSS (60^{O})**	ASTM D523	%	**15-60**
4	**FORMABILITY (T-Bend)**	ASTM D1737	T	**2T**
5	**REVERSE IMPACT- CROSSHATCH**	NCCA II-5		**No Pick Up**
6	**PENCIL HARDNESS**	ASTM D3363	min	**H**
7	**ADHESION**	ASTM D3359		
i	DRY	METHOD 8		**No Pick Up**
ii	WET	$37.8^{O}C$, 24hrs		**No Pick Up**
iii	BOILING WATER	$100^{O}C$, 20min		**No Pick Up**
8	**ABRASION RESISTANCE**	ASTM D968	Litres/Millilitres	**40**
9	**CHEMICAL RESISTANCE TEST**	ASTM D543		
i	10% HCL (1hrs)		**No Visual Change**	
ii	20% H_2SO_4 (72hrs)		**No Visual Change**	
iii	20% NaOH (18hrs)		**No Visual Change**	
iv	3% Detergent Solution ($38^{O}C$ for 72hrs)		**No Visual Change**	
v	Mortar pat test	AAMA 2605	**No Visual Change**	
10	**WEATHER-O-METER TEST**	ASTM D2244		
i	GLOSS RETENTION		**70% after 4000 hrs**	
ii	COLOR RETENTION		**Max. 5 Units after 4000 hrs**	
iii	CHALK RESISTANCE		**Max. 8 Units after 4000 hrs**	
G.	**Fire Properties**			
1	**Reaction To Fire**	EN13501-1		**Class B S1 D0**
2	**Resistance To Fire**	ASTM E119-12		**2 Hrs**

PRODUCT TOLERANCE : Panel Width: ± 2.0 mm; Panel Length: ± 4.0 mm; Panel Thickness: ± 0.2mm; Maximum Squareness: 5.0 mm; Maximum Bow: 0.5% of width and/or length; Coil Thickness: 0.03mm Tolerance

ALUDECOR AL 35 TECHNICAL SPECIFICATION

SL.NO.	DESCRIPTION	STANDARD	UNIT	AL 35
A.	**PRODUCT DETAILS & THICKNESS**		mm	3
1	COVER SHEET THICKNESS		mm	0.5
2	ALLOY	ASTM B209 M		AA3105
3	CORE MATERIAL		**LDPE**	
B.	**ALLOY DESCRIPTION**	ASTM B209 M		H14/ H16
C.	**PHYSICAL PROPERTIES (For ACM)**			
1	WEIGHT	ASTM D592	Kg/m^2	4.76
2	WATER ABSORPTION	ASTM C272	%	NIL
3	COEFFICIENT OF THERMAL EXPANSION-α	ASTM D696	$^{O}/C$	24.0×10^{-6}
D.	**MECHANICAL PROPERTIES**			
	ALUMINIUM SKIN			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	Min. 145
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	Min. 120
3	ELONGATION	ASTM E8	%	5
4	MODULUS OF ELASTICITY	ASTM E8	$Mpa(N/mm^2)$	> 68000
5	SURFACE RESISTIVITY (STATIC CHARGE)	ASTM D257	Ω	1.6×10^{12}
E.	**ALUMINIUM COMPOSITE PANEL**			
1	TENSILE STRENGTH	ASTM E8	$Mpa(N/mm^2)$	35
2	TENSILE YIELD (0.2% PROOF STRESS)	ASTM E8	$Mpa(N/mm^2)$	25
3	BOND INTEGRITY (PEEL STRENGTH)	ASTM D903	N/mm	6
4	ELONGATION	ASTM E8	%	5
5	SOUND TRANSMISSION CLASS	ASTM E 413	dB	25
F.	**COATING DETAILS**			
1	**COATING TYPE**	AAMA 2605	**PVDF/Lumiflon resin based Flurocarbon Coating**	
2	**COATING THICKNESS**	AAMA 2605	**25-28µ (For Two Coat) 30-35µ (For Three Coat)**	
3	**GLOSS (60^{O})**	ASTM D523	%	**15-60**
4	**FORMABILITY (T-Bend)**	ASTM D1737	T	**2T**
5	**REVERSE IMPACT- CROSSHATCH**	NCCA II-5		**No Pick Up**
6	**PENCIL HARDNESS**	ASTM D3363	min	**H**
7	**ADHESION**	ASTM D3359		
i	DRY	METHOD 8		**No Pick Up**
ii	WET	$37.8^{O}C$, 24hrs		**No Pick Up**
iii	BOILING WATER	$100^{O}C$, 20min		**No Pick Up**
8	**ABRASION RESISTANCE**	ASTM D968	Litres/Millilitres	**40**
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iv	3% Detergent Solution ($38^{O}C$ for 72hrs)		**No Visual Change**	
v	Mortar pat test	AAMA 2605	**No Visual Change**	
10	**WEATHER-O-METER TEST**	ASTM D2244		
i	GLOSS RETENTION		**70% after 4000 hrs**	
ii	COLOR RETENTION		**Max. 5 Units after 4000 hrs**	
iii	CHALK RESISTANCE		**Max. 8 Units after 4000 hrs**	

PRODUCT TOLERANCE : Panel Width: ± 2.0 mm; Panel Length: ± 4.0 mm; Panel Thickness: ± 0.2mm; Maximum Squareness: 5.0 mm; Maximum Bow: 0.5% of width and/or length; Coil Thickness: 0.03mm Tolerance

Technical

Annexure 3

EXOVA Test Certificates

EXOVA Test Certificates

Exova Warringtonfire
Holmesfield Road
Warrington
WA1 2DS
United Kingdom

T : +44 (0) 1925 655 116
F : +44 (0) 1925 655 419
E : warrington@exova.com
W: www.exova.com

Testing. Advising. Assuring.

Title:

A fire resistance test performed on a specimen of a fire retardant aluminium composite panel non load bearing partition wall to ASTM E119-12

Report No:

334186

Prepared for:

Aludecor Lamination Pvt. Ltd.
Suite No. 52
5th Floor
1 RN Mukherjee Road
Kolkata – 700001

Date:

31st October 2013

Notified Body No:

0833

0249

Technical

Summary

Objective	To evaluate the fire resistance performance of a specimen of non-loadbearing partition when subjected to a test given in ASTM E119-12.
Sponsor	**Aludecor Lamination Pvt. Ltd.,** Suite No. 52, 5th Floor, 1 RN Mukherjee Road, Kolkata – 700001
Summary of the Tested Specimen	The partition had overall nominal dimensions of 3035 mm high by 3000 mm wide and comprised a steel stud framework, faced on each side with nominally 15 mm thick plasterboard. The insulated core to the partition comprised a layer of nominally 50 mm thick mineral fibre (to the exposed face) and a layer of 25 mm thick ceramic fibre (to the unexposed face). 6 No. Fire Retardant Aluminium Composite panels, Each of overall dimensions 1500 mm wide by 1000 mm high, were then riveted to the outer face via angle brackets.
Test Results:	
Passage of flames and hot gases	120 minutes*
Temperature Rise	120 minutes*
Hose Stream	A hose stream test was conducted immediately after the fire test, in accordance with clause 7.6 of ASTM E119-12. The requirements of the hose stream test were satisfied.
	* The test duration. The test was discontinued after a period of 120 minutes.
Date of Test	12th October 2013

certifire

CERTIFICATE OF APPROVAL
No CF5916

This is to certify that, in accordance with
TS00 General Requirements for Certification of Fire Protection Products
The undermentioned products of

ALUDECOR LAMINATION PVT. LTD

Suite No.52, 5th Floor, Martin Burn Buildings, 1 RN Mukherjee Road, Kolkata-700001 (West Bengal), India
Tel: +91 33 40276600

Have been assessed against the requirements of the Technical Schedule(s) denoted below and are approved for use subject to the conditions appended hereto:

CERTIFIED PRODUCT	TECHNICAL SCHEDULE
"Aludecor Firewall A2"	TS 20
See Annex 1 for detailed product information	Classification A2-s1, d0

Signed and sealed for and on behalf of Warringtonfire Testing and Certification Limited

Paul Duggan
Certification Manager

Issued: 20th October 2020
Audit Test Frequency: Annually
Valid to: 13th December 2023

Page 1 of 9

CF 6002 FireWall Class-B

certifire

CERTIFICATE OF APPROVAL
No CF 6002

This is to certify that, in accordance with
TS00 General Requirements for Certification of Fire Protection Products
The undermentioned products of

Aludecor Lamination Pvt Limited

Suite No.52, 5th Floor, Martin Burn Building, 1 RN Mukherjee Road,
Kolkata-700001 (West Bengal), India
Tel: +91 33 40276600

Have been assessed against the requirements of the Technical Schedule(s) denoted below and are approved for use subject to the conditions appended hereto:

CERTIFIED PRODUCT	TECHNICAL SCHEDULE
	TS 72
"ALUDECOR- Firewall" / "Aludecor Firewall – ZCP+ (Z-A)"	Classification B-s1, d0
See Annex 1 for detailed product information	

Signed and sealed for and on behalf of Warringtonfire Testing and Certification Limited

Paul Duggan
Certification Manager

Issued: 15th June 2021
Audit Test Frequency: Annually
Valid to: 14th June 2026

warringtonfire certifire CERTIFICATION

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ewcl5

CERTIFICATE OF APPROVAL
No ME 5092

ALUDECOR LAMINATION PVT. LTD

Suite No.52, 5th Floor, Martin Burn Buildings, 1 RN Mukherjee Road, Kolkata-700001 (West Bengal), India
Tel: +91 33 40276600

Have been assessed against the requirements of the test standard(s) denoted below and are approved for use subject to the conditions appended hereto:

CERTIFIED PRODUCT	TEST STANDARD
"ALUDECOR-Firewall"	TS 19 BS 476: Part 7: 1997– Method of test to determine the classification of the surface spread of flame of products BS 476: Part 6: 1989 + A1: 2009 - Method of test for fire propagation of products Class 1 and Class 0, as defined in paragraphs A12 and A11 of Approved Document B "Fire Safety" to the Building Regulations 2000 for applications requiring Class 0 or Class 1 surface

Signed and sealed for and on behalf of Warringtonfire Testing and Certification Limited

Paul Duggan
Certification Manager

Issued: 6th September 2017
Revised: 28th October 2020
Valid to: 5th September 2022

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Male Female Rainscree n

Aludecor
Metal Composite Panel

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CIN: U27203WB2004PTC099221