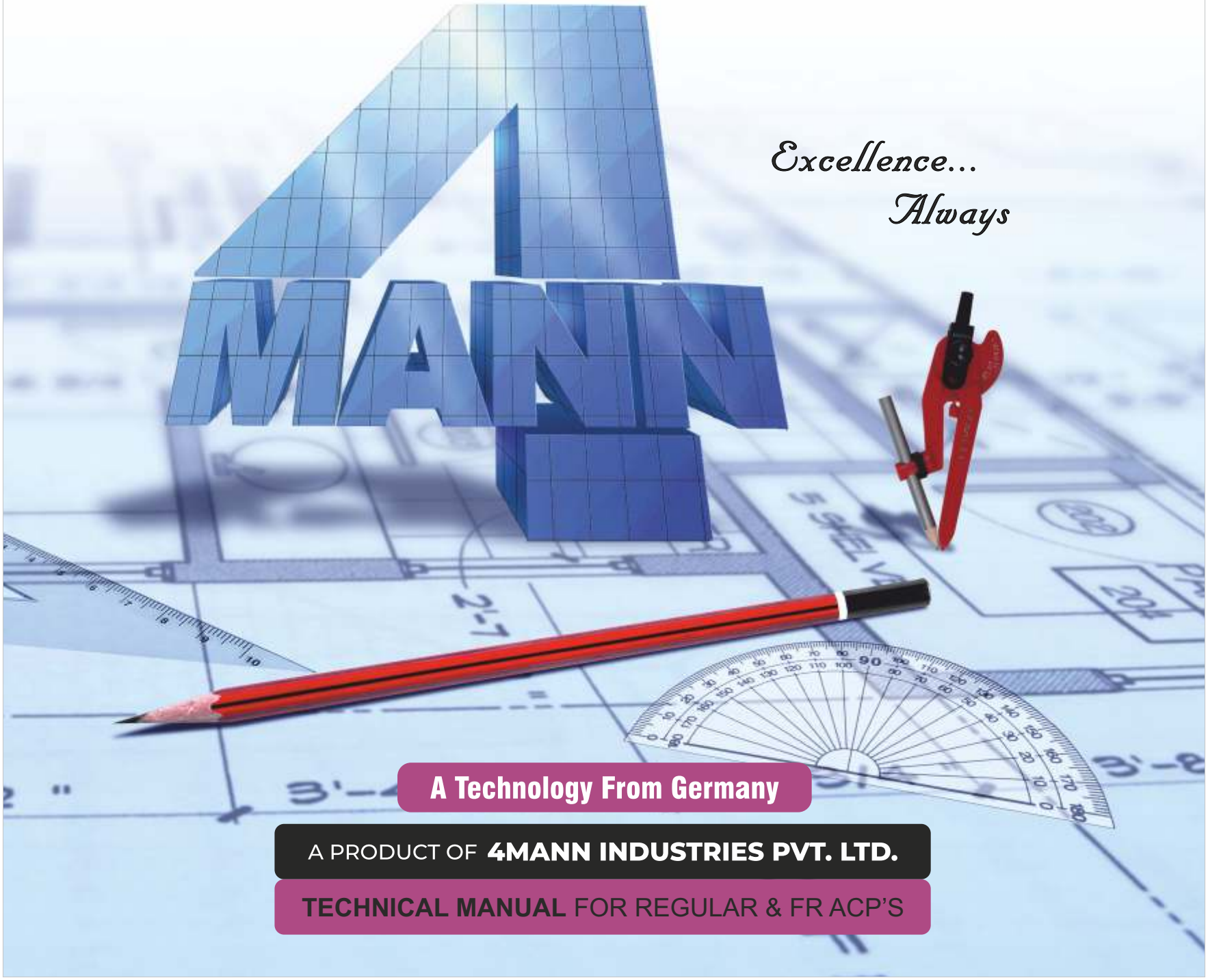
SINCE 2002

4MANN™

4MANN GROUP

EXCELLENCE... ALWAYS



A Technology From Germany

A PRODUCT OF **4MANN INDUSTRIES PVT. LTD.**

TECHNICAL MANUAL FOR REGULAR & FR ACP'S

ABOUT 4MANN GROUP

Founded in 2002, 4MANN Group is one of the leading business houses in India having its Headquarter in Mumbai. The Group is engaged in manufacturing, marketing and distribution of new age building materials and allied products. The Group leverages on its wealth of experience, spanning over a decade, in enhancing the aesthetics of the exterior and interior of buildings. The Group's diverse business interests includes Building Material Products like Aluminium Composite Panels, Imported & Domestic Natural Decorative Veneer, Acrylic Resin, Decorative Wall, Decorative MDF, Solid Surfaces, Magic Highlighter, Charcoal Panels, Alabaster Sheets, Plywood, Decorative Laminates, Hardware and many other interior products, Road Signage & Safety Product. The Group is also in to Pellets and Iron Ore business.

ABOUT 4MANN INDUSTRIES PVT. LTD.

4MANN industries Pvt. Ltd. is primarily in to manufacturing and marketing Premium & Exclusive range of Aluminium Composite Panels under the brand names 4MANN® and ARROWBOND in India & abroad and is regarded as one of the market leaders in the ACP industry. 4MANN Industries Pvt Ltd is an ISO 9001 : 2015 certified company and is also a member of Indian Green Building Council with its manufacturing facility at Jammu accredited under the Green Category by the State Pollution Control Board of Jammu & Kashmir.

The company with its state-of-the-art production facility in Jammu, using German Technology, has a total installed capacity of 3 million square meters per annum. It also has a full-fledged in-house laboratory for testing products so as to ensure they conform to International Standards and Specification. Due to stringent quality control parameters and testing processes, the product offered is highly durable and is preferred choice of many leading architects, corporate houses, consultants, builders, interior designers, fabricators and contractors.

With more than 75 field staff, 11 depots and 20,000+ Business Partners spread across India, the company strives to provide timely and quality services to its customers. The team is also engaged in proactive research and development initiatives to ensure that their product is continuously evolved to meet the emerging needs of our customers.

CONTENTS

ALUMINIUM COMPOSITE PANEL SPECIFICATION

Parameter	Specification	Tolerances
Thickness(mm)	3.00 & 4.00	±0.20
Skin thickness (mm)	0.50, 0.30, 0.25, 0.21, 0.15	±0.02
Width(mm)	1220, 1550(max)	±2.00
Length (mm)	1000 to 8000	±0.1%
Top coat - PVDF thickness(μm)	26~30	±5
Squareness of the length	.....	±0.1%
Bow of the panel(of the length)	.....	±1%

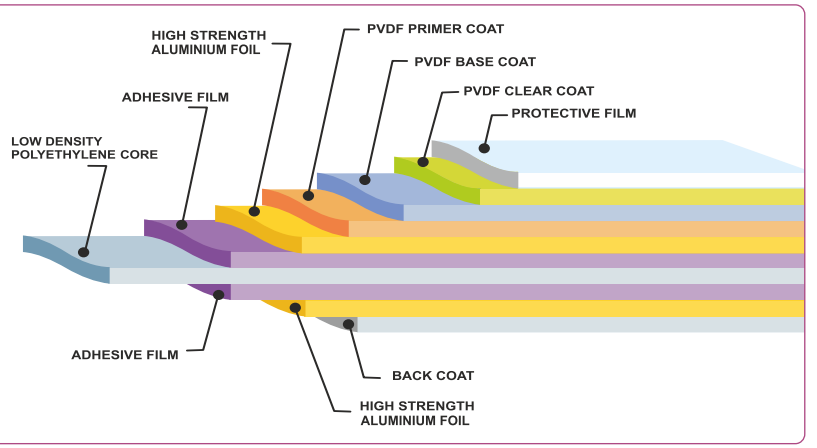
SIZES & COLORS

Standard size ranges: 1220mm x 2440mm (4' x 8')
1220mm x 3050mm (4' x 10')
1220mm x 3660mm (4' x 12')

PRODUCT TYPE	COMPOSITION	APPLICATION
4F-Platinum-4mm	Skins of 0.5mm thick Aluminum, Polyethylene core and of PVDF surface finish	Architectural/ Exterior
4P-Pearl-4mm	Skins of 0.25mm thick Aluminum, Polyethylene core and PVDF surface finish	Exterior/ Interior
3R-Ruby-3mm	Skins of 0.25mm thick Aluminum, Polyethylene core and PVDF surface finish	Exterior/ Interior
Special 4mm and 3mm	Skins of 0.30/0.25/0.15mm thick Aluminum, Polyethylene core and Polyester or Anodized surface finish	Interior

CROSS SECTION OF THE 4MANN© ACP

COMPOSITION CHART



QUALITY ASSURANCE MODEL

Input Inspection stage

- Surface protection film of 3 layer of 70 -100μm
- PVDF coating 26~30μm
- Top Aluminum skin of 0.50mm/0.25mm/0.15mm
- Dupont Adhesive Film of 3 layer of 70μm /50μm/30μm
- Polyethylene core of 3mm, 2.5mm or 3.5mm
- Dupont Adhesive Film of 3 layer of 70μm/50μm/30μm
- Bottom Aluminum skin of 0.50mm/0.25mm/0.15mm
- PE Washcoat of 5 - 10μm

MFG. PROCESS

Online / Final Inspection

- Periodic Product performance tests
- Continuous visual checks
- Hourly Peel strength graphical analysis by Universal Testing Machine(UTM)
- Online Peel strength checking by Push Pull Gauge
- Periodic checking of thickness, length manually

TECH BUILDING



ALUMINIUM SKIN

All **4MANN**© ACPs are manufactured using superior alloys aluminium which during its entire life cycle suits to all the stages of its use and processing. The common alloys used in **4MANN**© ACPs are AA1100 and AA3003. Any other customer specified alloys apart from the two common alloys can be made on request.

Properties of Aluminium skin

Properties	Standard	Alloys	
Alloy	ASTM B209M	AA 1xxx	AA 3xxx
Temper	ASTM B209M	H18/H16	H18/H16
Tensile Strength	ASTM E8	R_m 140 N/mm²	R_m 150 N/mm²
0.2% Proof Stress	ASTM E8	$R_{p0.2}$ 110 N/mm²	$R_{p0.2}$ 120 N/mm²
Elongation	ASTM E8	A_{50} 6%	A_{50} 8%
Modulus of Elasticity	ASTM E8	70,000 N/mm²	70,000 N/mm²

COATINGS ON 4MANN© ACP

All **4MANN**© ACP sheets of exterior grade are coated with PVDF (Polyvinylidene difluoride) with Kynar 500 (min 70%) or equivalent branded coatings. These coatings are time tested and proven for their excellent weather resistance, resistance to UV radiation, pollution, natural acid rain, smoke and dust. The coating is also popular for its highest gloss retention, colour retention, easy washability and maintenance, best chalk resistant and superior life. The interior grade is coated with high durable Polyester (PE) or anodized to enhance their excellent looks and retain all the qualities in the indoor atmosphere.

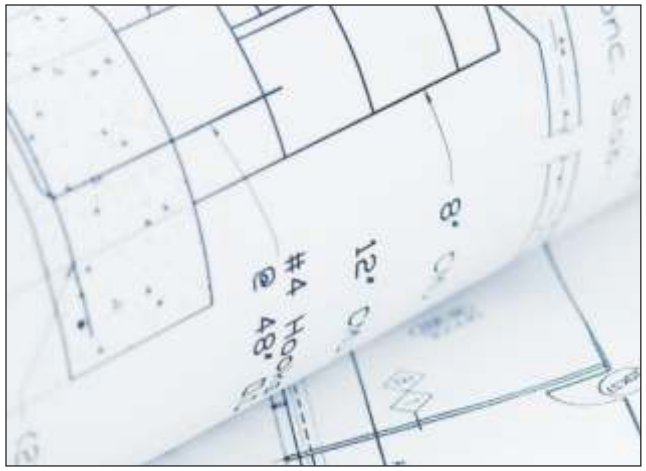
Properties of PVDF coatings

Coating Properties	Standard	4MANN Specification
Lacquering	Chemical	PVDF
Coating thickness	ASTM D 7091	26~30μm
Gloss at 60° angle	ASTM D 523	≥ 30%
Formability (T - Bend)	ASTM D 4145	No Crack T / No Pick off 0T
Cross Hatch	ASTM D 3359	≥3A
Hardness - Pencil	ASTM D 3363	≥ 2H
Abrasion Resistance(Falling sand)	ASTM D 968	≥40 Liters/mil
Immersion Test: 5% HCL	ASTM D 1308	No Damage
Immersion Test: 5% H_2SO_4	ASTM D 1308	No Damage
Immersion Test: 5% NaOH	ASTM D 1308	No Damage
Immersion Test: Detergent	AAMA 2605	No Damage

*Tolerance applicable

Aluminium Composite Panel 4MANN© ACP

4mm ACP (0.5mm skins and PE core)	Standard	4MANN© ACP Specification
Panel Thickness	.....	4.0 mm
Weight	.....	5.6 Kg/m²
Polyethylene Core Density	ASTM D 792	0.97 gm/cm³
Peel strength	ASTM D 908	≥ 10 N/mm
Peel strength	ASTM D 1876	≥ 150 N/25mm
Tensile Strength	ASTM E 8	≥ 4.5 Kg/mm²
Yield strength	ASTM E 8	≥ 4.0 Kg/mm²
Elongation	ASTM E 8	≥ 5%
Heat transition coefficient (U-value)	ASTM C 1363	≥ 5.5 W/m²K
Water Absorption	ASTM D570	≤ 0.02%
Deflection Temp(under 1.8Mpa)	ASTM D 648	≥ 121°C
Thermal Expansion	ASTM D 696	≤ 0.024 mm/M/°C
Sound Transmission loss(STC)	ASTM E 90	≥ 26 db



4MANN© ACP Features

Composite panel or aluminium panel sheet is a widely-used term to describe flat panels that consist of a non-aluminium core bonded to two aluminium sheets. Some main features of an ACP are as follows:

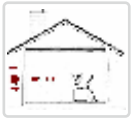
Weather proof: An aluminium composite panel on building is not affected by severe weather conditions such as in the tropical areas, coastal areas with high humidity.

Flat: One of most unique physical property of ACP is that it is flat, smooth & even surface.

Flexibility: An ACP's ability to be curved, cut or drilled for holes makes it easy to make various shapes with the simplest of tools.

Durance & Shock resistance: The plastic characteristic helps the ACP to shock resistance such as windstorm, earthquake avoiding various types of impacts.

Reducing dead-load: An ACP is comparatively much lighter in weight and also have a higher strength to weight ratio than the other building materials such as glass, iron, steel etc of same sizes. This makes an ACP provides more safety from catastrophic events like cyclones, earthquakes, etc.



Insulating and sound proofing: ACP maximizes the effect of insulation and sound proofing. Polyethylene does not allow heat and sound to penetrate into inside of building due to its plastic core.

Fire-resistance: The fire does not reach easily the Polyethylene in ACP due to its composite structure between two aluminium skins.

Non-erosion: As aluminium is a non-rusting and a stable metal in external conditions, the composite structure provides higher strength and stability in all weather conditions.

Maintenance: An ACP is absolutely low on maintenance and needs only general cleaning methods.

Environment friendly: An ACP is safe and recyclable. It can replaced for wooden ply in many applications.

Decorative and colorful: It is easy to create or choose a building's look and feel from the varied and distinctive factory finished colors or customized colors with modern finishes.

PROCESSING METHODS

Aluminium processing & woodworking machines and tools are used in the fabrication of the panel.

SAW CUTTING

Vertical panel saws of good quality and even portable circular saws equipped with a system of guides can be used to ensure straight line cuttings.

CIRCULAR ROUTING BLADES & ROUTER BITS

One of the main features of **4MANN**© ACP are that they can be routed through local panel routing machine to internationally designed vertical panels saws including hand panel routers with various kinds of routing blades.

BENDING

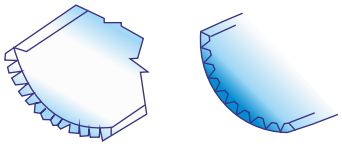
4MANN© ACP can be bent with jig, press brake or plate punch.

BENDING WITH BRAKE PRESS

Use top die having the desired radius while bending the **4MANN**© ACP with a press brake.

BENDING WITH 3-ROLLER BENDER

4MANN© ACP are bent in a 3-Roller bending machine for a larger bending radius.



BENT TRAY PANELS

4MANN© ACP can be bent after routing to any desired shape with proper cuttings to the collars.

WELDING

4MANN© ACP edges can be joined by welding the core with the help of Hot Jet Gun.

4MANN® ACP can be shaped using a very simple fabrication method. The technique, called the routing and folding method, enables a fabricator to produce shapes of various kinds and sizes. A V-shaped or rectangular groove is routed on the reverse side of the **4MANN**® ACP using a disk or end milling cutter. This is then folded carefully to desired shape of different sizes with clean folding lines.

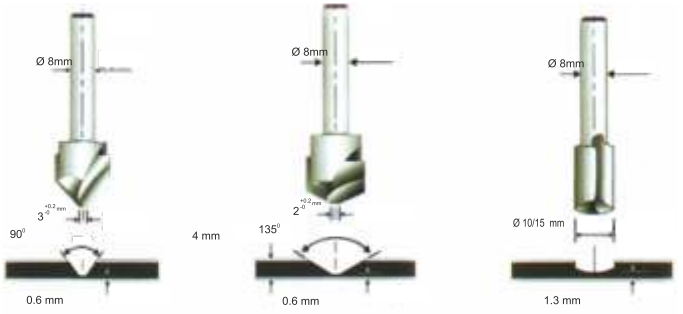
4MANN® ACP are recommended to rout to below details of correct routing depth for different bending applications. The routing tools recommended are Vertical panel saws or CNC routing stations. If fabrication is done onsite then hand routing machines can be considered with a carbide tip cutting tools. In any routing method, a thin layer of the core material should be left at the base of the groove, i.e. on the inside of the outer cover sheet. The untouched outer cover sheet can now be bent manually, giving an exact and clean folding line which follows the routed groove. It is recommended to use 'BOSCH' company routing and cutting machine for fabrication.

Apart from the routed tray panel system, other techniques can also be adopted using various tapes and sealant adhesion system, which should be followed strictly in accordance with the respective tape or sealant manufacturer's recommended fabrication method.

Note: The cutting or routing tools should not generate heat (happens in non carbide tip tools or multiple attempt of routing) while routing or cutting. Care must be taken to replace the cutting or routing tool to prevent damages to the panel.

4MANN® ACP ROUTING DEPTH

Details of various types of circular blades and router bits are shown in following figures.



GENERAL PRECAUTIONS:

A. Linear Thermal Expansion/Contraction(LTE or LTC)

Linear thermal expansion coefficient of **4MANN**®ACP sheets is the same as aluminium metal. Therefore, movement will not occur between the aluminum and **4MANN**®ACP sheets. However, a certain extent of movement is anticipated between **4MANN**®ACP sheets and structural materials such as steel and concrete.
This movement is normally very small (0.5mm/m or 0.02"/3') in case of indoor applications, but it must be relieved with a suitable method such as spacing between panels. In outdoor applications, the temperature change will be nearly twice of the above.

B. Prevention from Edge corrosion

4MANN®ACP have a corrosion resistant primer behind aluminium skins to prevent the edge from corrosion and this panel is a non-permeable material. But we still recommend a careful panel detail in which cut edge is not exposed to corrosive or outdoor atmosphere for long time. When **4MANN**®ACP sheets are used in a humid area such as in bathroom, it is important to drain the moisture to keep the edges dry.

C. Installation direction for coatings

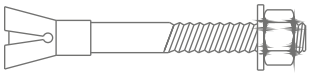
In Metallic Colors, slight color difference will be noticeable between the panels installed in different directions. Install panels in the same direction as marked on the protective film and behind the panel. The same note holds true in Marvel and Wood panels. In Solid Colors, the color difference due to coating direction is negligible.

D. Reinforcement

Reinforcement behind panels are decided on the basis of side panel, installation height, location wind pressure, width of the panel etc.

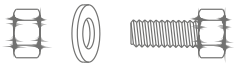
FIXING ACCESSORIES

1



M8x65mm LONG ANCHOR BOLT

2



M8x25mm LONG NUT & BOLT

3

25mm LONG SCREW

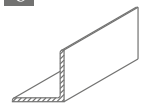
4

SEALANT WITH BACKING ROD

5

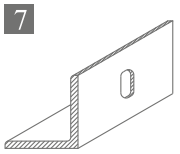
ALUMINIUM POP RIVET

6



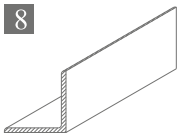
20x20x2mm THK. ALUMINIUM ANGLE

7



40x40x4mm THK. x 100mm LONG ALUMINIUM BRACKET

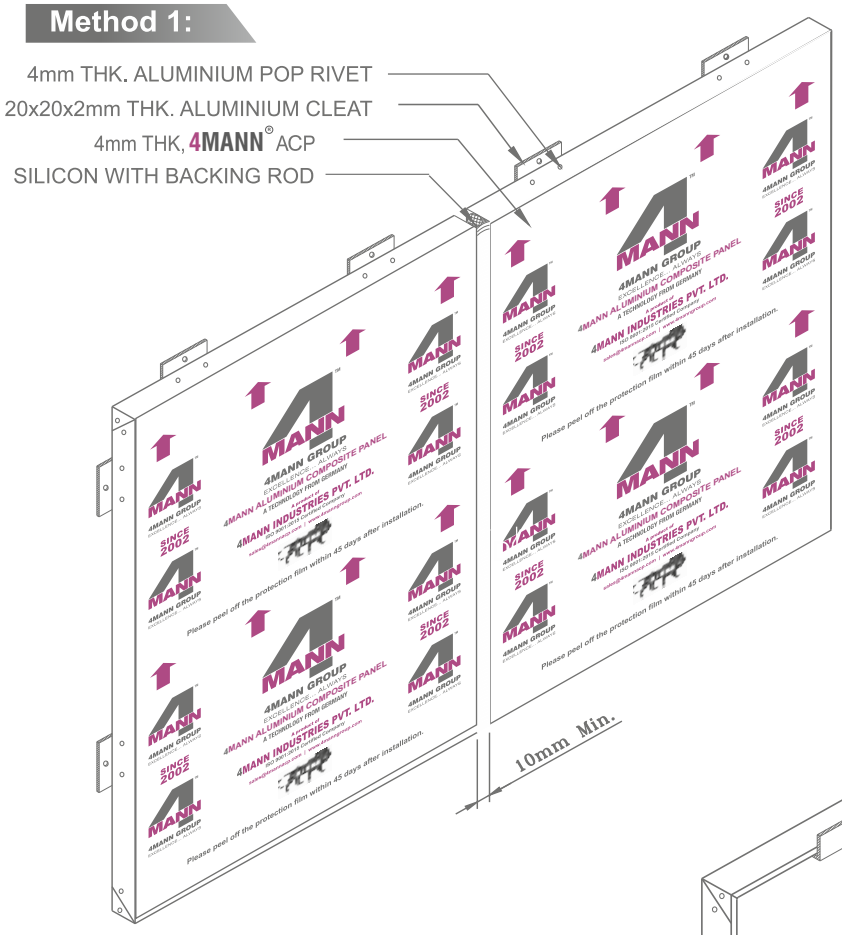
8



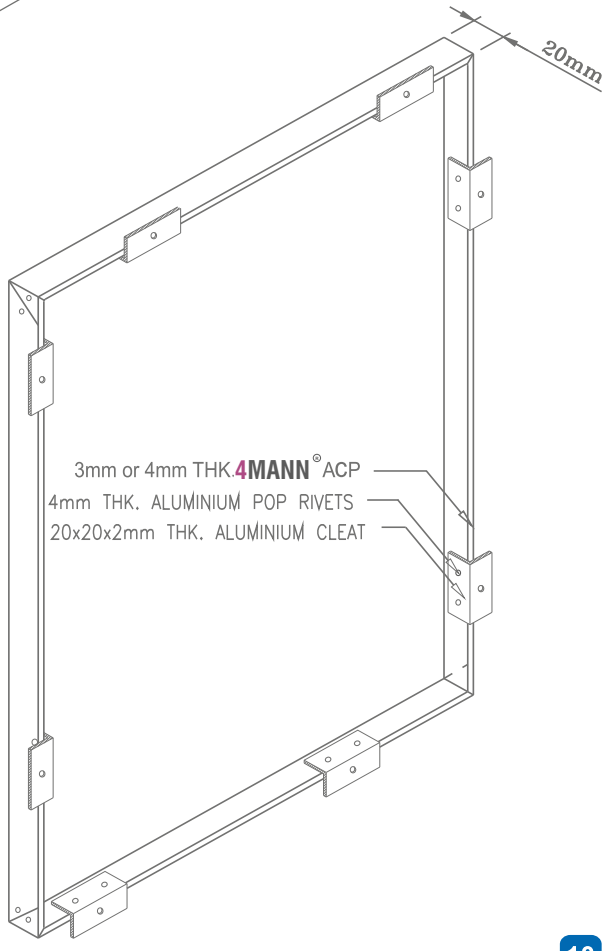
40x40x4mm THK. ALUMINIUM CONTINUOUS ANGLE

INSTALLATION DETAILS

Method 1:



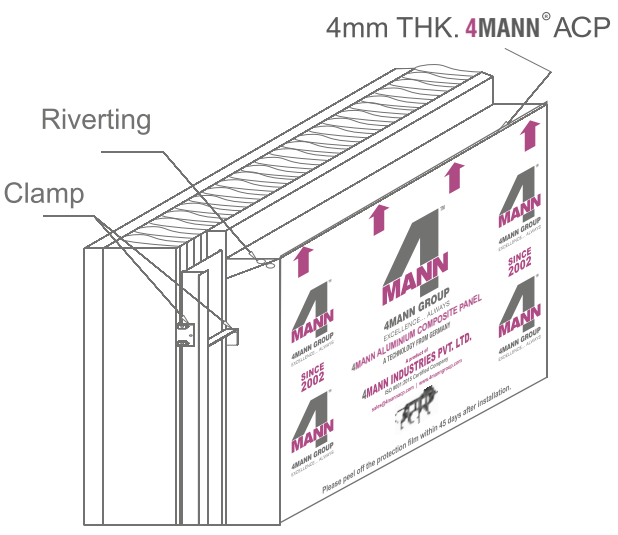
Front view of 4MANN® Fabricated ACP

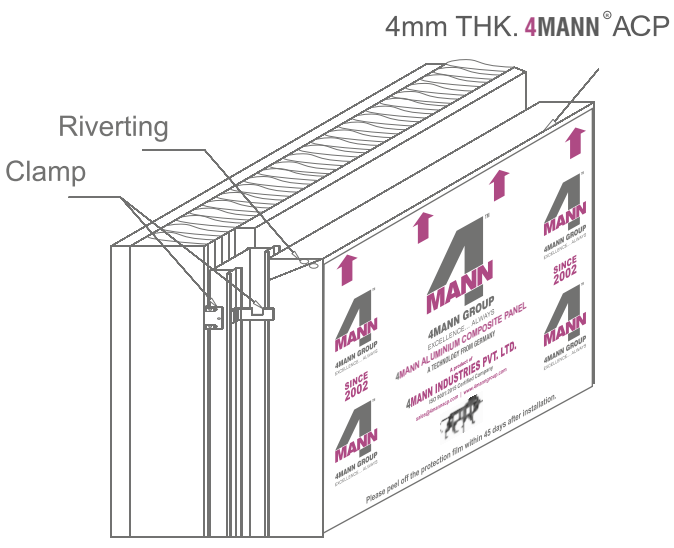


Rear view of 4MANN® Fabricated ACP

Method 2 & Method 3:

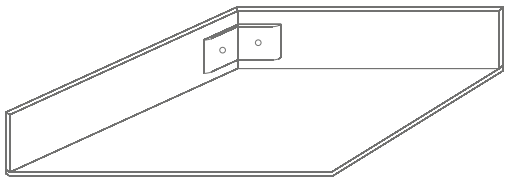
Cassette fixing for 4MANN® ACP, Improved wind and damp proof proposties. Convenient mobile fasteners.



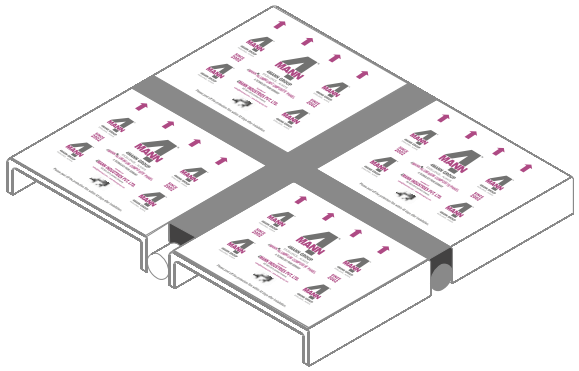


Routing and return folding of 4MANN® ACP is done by V-groove cutting with a panel saw or hand panel saw with a standard depth of routing by keeping margin from edge of the panel to the center of the depth of the groove, within 15-25mm uniformly around the edges and folded inside so that the outer skin exposes outside and made a tray is called a tray panel.

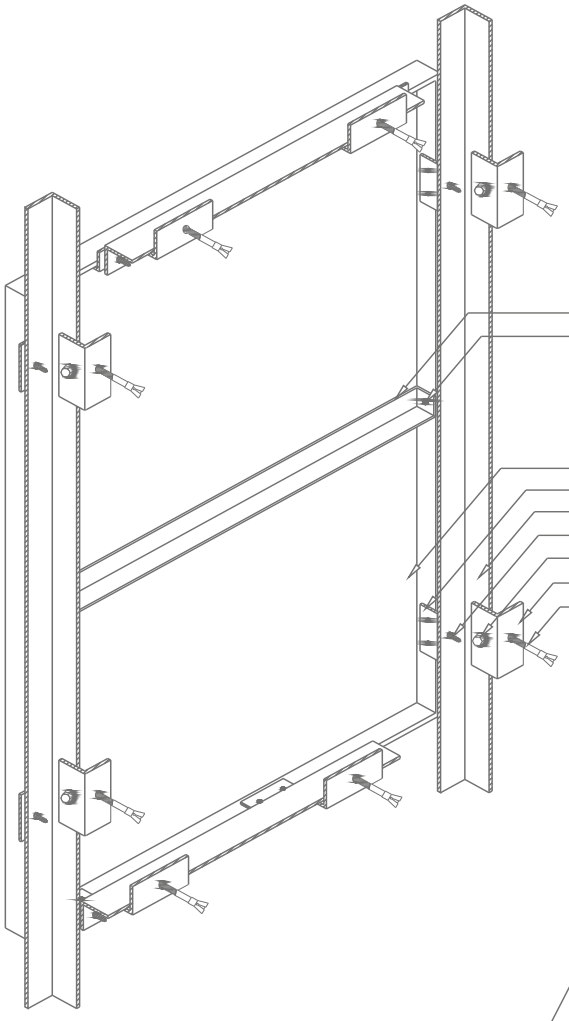
Rout and Returns (R&R) Formed Panel



Rout and Return Joint Intersection



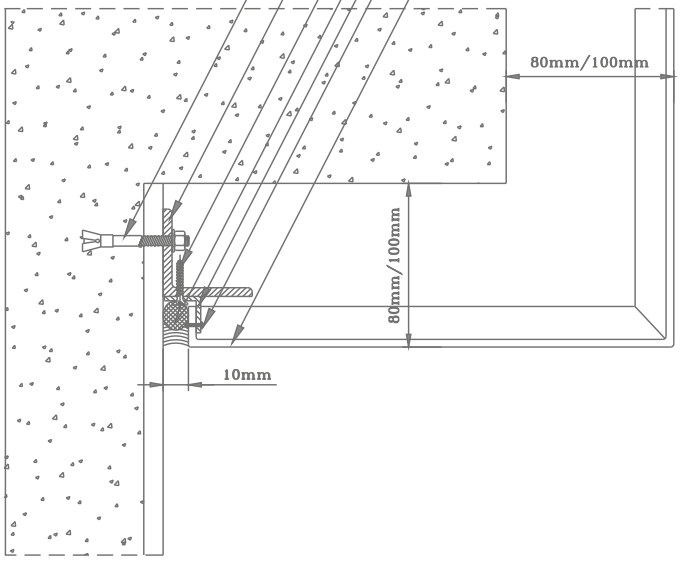
Rout and Return are then caulked and sealed to prevent moisture penetration.



ANGLE SUPPORT IF REQUIRED
4mm THK. ALUMINIUM POP RIVET

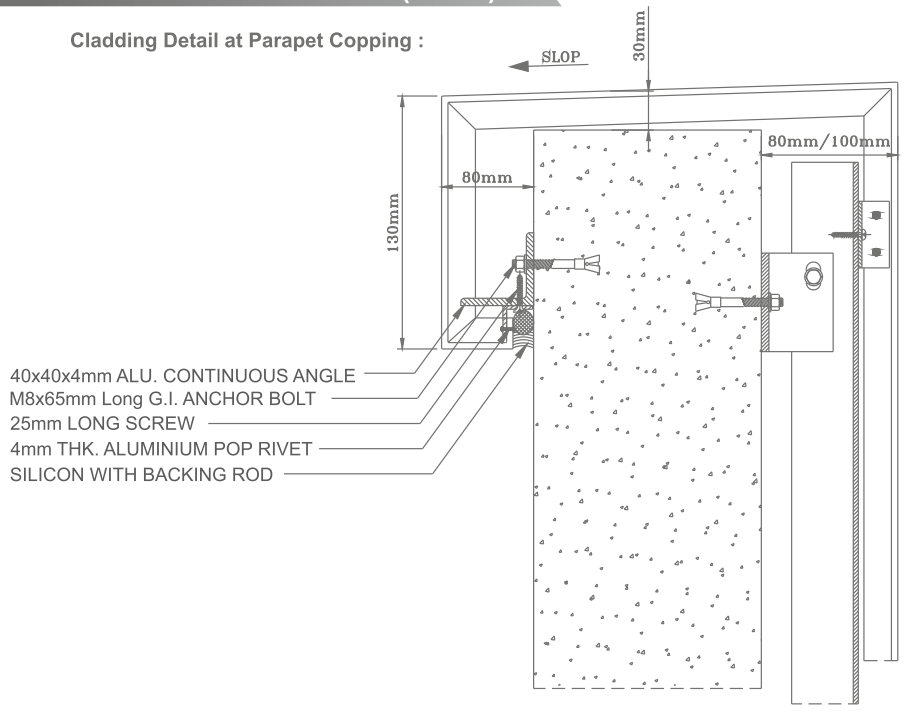
4mm THK.4MANN® ACP
20x20x2mm THK. ALUMINIUM CLEAT
40x40x4mm ALU. CONTINUOUS ANGLE
25mm LONG G.I. NUT & BOLT
M8x25mm LONG G.I. NUT & BOLT
40x40x4mm THK. ALU. BRACKET
M8x65mm Long G.I. ANCHOR BOLT
TO STRUCTURAL (OR) BLOCK WALL

M8x65mm Long G.I. ANCHOR BOLT
40x40x4mm ALU. CONTINUOUS ANGLE
25mm LONG SCREW
SEALANT WITH BACKING ROD
20x20x2mm THK. ALUMINIUM CLEAT
4mm THK. ALUMINIUM POP RIVET
4mm THK.4MANN® ACP

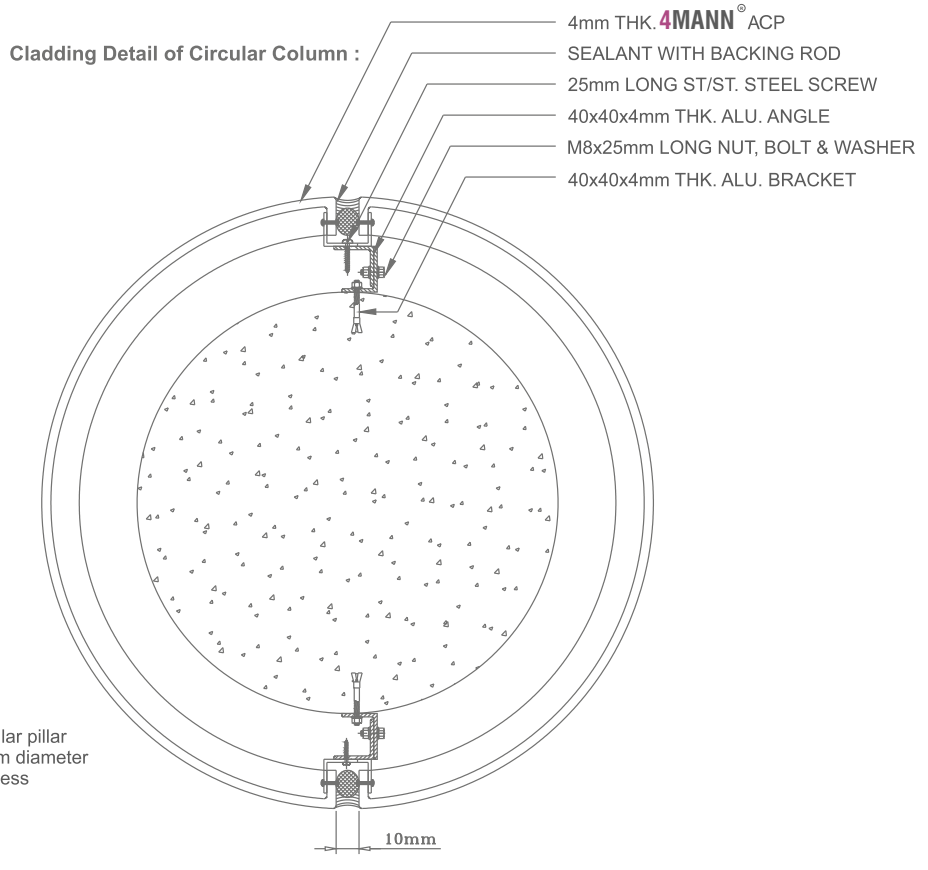


Cladding To Structural Wall Interface (Soffit) :

Cladding Detail at Parapet Copping :

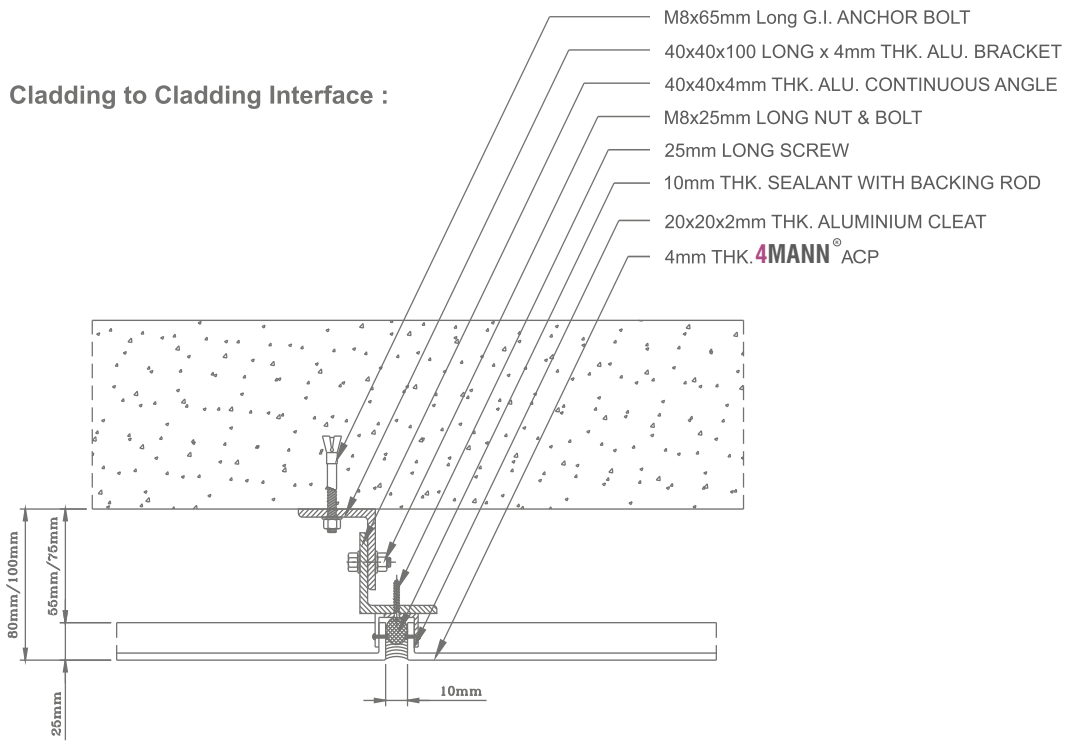


Cladding Detail of Circular Column :

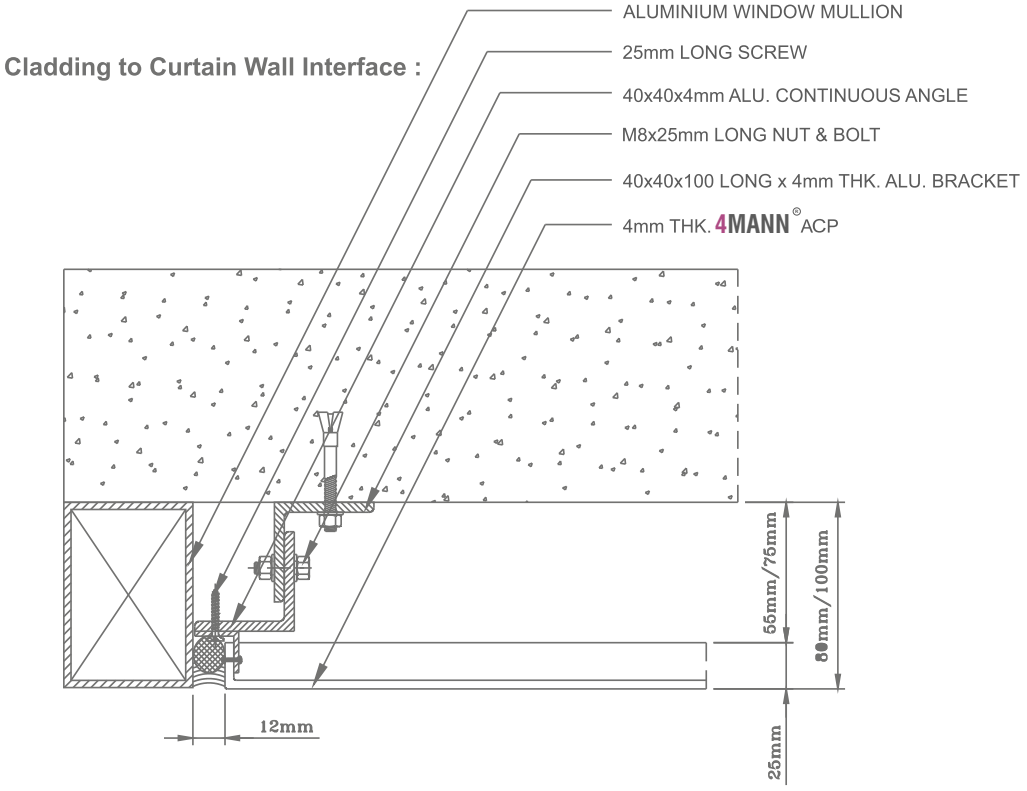


NOTE : For 4MANN® ACP circular pillar formation recommended minimum diameter should be 30 times of ACP thickness

Cladding to Cladding Interface :



Cladding to Curtain Wall Interface :



Routine cleaning of the ACP surface is recommended. It may be washed with solution of water and detergent and can be followed by a clean water rinse. The frequency with which cleaning is to be carried out and the choice of a suitable cleaning agent depends largely on the position of the building being cleaned and degree of contamination. Do not clean sun-heated surfaces (above 40˚C) to avoid rapid drying which may lead to stain formation on the ACP. The cleaning operation must be followed by a through rinse of clean water to ensure the removal of remnants of the cleaning agent. A final wipe down by means of a sponge, leather or wiper is necessary to avoid water stains.

SCOPE

This manual is applicable to the cleaning and maintenance procedures for the external cladding of **4MANN**® ACP sheets coated by PVDF.

GENERAL NOTES

Not only Fluorocarbon coating but also Pre-colored, Polyester Acrylic resin or normal organic coatings onto Aluminium will not show an appreciate amount of dirt collection. However, the dirt and soil depends largely on the local atmospheric conditions where the building exists.

In heavily industrialized areas, coastal areas and the areas where construction works are being carried out, it might be necessary to increase the cleaning frequency for the sake of appearance and also for the purpose of removing the dirt and soil. Very often, rainfall is effective to remove the accumulated dirt and keep the external cladding clean. In areas of low rainfall, the cleaning frequency might need to be increased. Even in the same building, the portions which are in direct sight and areas at lower level might be cleaned more frequently and less obvious portions might be cleaned at some point. And in these areas, detrimental components might be deposited on the coated surface. The cleaning schedule of the sheets will be determined by these factors. The planning of the actual cleaning schedule of external cladding can be clubbed with cleaning operations for glass and painted aluminium components.

CLEANING FREQUENCY

Cleaning will be required more often in the following areas in general:

- Areas of low rainfall
- Heavily industrialized areas.
- The areas where construction works are being carried out.
- Foggy coastal regions with frequent cycles of condensation.

MACHINE CLEANING

A pre-test should be done in the early stage of equipment design to confirm that there is no detrimental effect on the coating as well as to clarify the cleaning effect and frequency of the usage of the automatic wall cleaning machine.



CLEANING PROCEDURES

After project completion, the residue construction soils including concrete or mortar, etc. should be removed as quickly as possible. In majority of the cases, the following suggested frequency would be required to keep the coated surface clean for as long as it can remain

Building Location	Wash Frequency
Rural area	1-2 / year
Urban area	2-3 / year
Low rainfall and/or coastal area	3-4 / year
Heavily industrialized area	3-4 / year

PRE-CLEANING

In order to remove the light soil, it is recommended to do some tests to determine the degree of cleaning actually necessary to accomplish the task, Prior to any cleaning application, a forcejet water rinse from the top to bottom is recommended as an initial step of tests. The low water volume with moderate pressure is much better than the considerable water volume with little pressure. When cleaner is applied, physical rubbing with soft sponges or soft rags fully dipped into the liquid solution is also helpful.

SOIL REMOVAL

The simplest procedure of the removal of the soil would be water rinse with moderate pressure. If this does not remove the soil, then a concurrent water spray with sponge should be tested. If the soil is still adhering after drying, then a mild detergent or 5-10% IPA (Isopropyl Alcohol) solution will be necessary.

CLEAN DETERGENTS / SOLUTIONS

When a mild detergent or 5-10% IPA solutions is used for removing soil, it should be used with soft sponges and /or soft rags. The washing should be done with uniform pressure and normally the operation is done with horizontal motion first and then with a vertical motion. After washing, the surface should be thoroughly rinsed with clean water, and the rinsed surface is air-dried or wiped with squeegee or lint-free cloth.

OPERATION SEQUENCE

Dripping of cleaner to the lower portions of the building should be minimized. When some sundown is unavoidable, the areas should be rinsed as soon as possible to eliminate streaking. Generally, the cleaning and rinsing operation moves from top to bottom of the building. Avoid drips and splashes during cleaning. Remove dripping as quickly as possible.
Note : In case of one storey or low elevation buildings, it is recommended to CLEAN FROM BOTTOM – UP and RINSE FROM TOP-DOWN.

COATING PROTECTION

Always be aware that is very difficult to remove sealant and machine oils after it is hardened. During construction, the protective film should be retained to a maximum of 45 days from the date installation to protect the coated surface from stains caused by sealant and machine oils. If adhered, these stains should be removed as early as possible before hardening, with suitable detergents.

SCRATCH PREVENTION

Make sure that cleaning sponges or rags are grit free, to prevent the coated surface from scratch. Avoid over cleaning or excessive rubbing.

SINCE 2002

4MANN™

4MANN GROUP

EXCELLENCE... ALWAYS

FIRE RATED

Excellence...

Always

4MANN® FR

A PRODUCT OF **4MANN INDUSTRIES PVT. LTD.**

4MANN® FR is composed of fire resistant mineral filled core sandwiched between two skins of selected thickness of architectural aluminum skin of engineered alloy with Kynar 500(PVDF) lacquered surface on front and service coated on rear. **4MANN**® FR panels can be processed and fabricated as any other **4MANN**® ACPs that are very tough, weatherproof and, above all, do not actively contribute to combustion in fire.

Fire behaving in a building

While glass breakage / fallout
allows fire to enter / exit,
4MANN® FR ACP & FR cladding restrict / prevents fire spread

REGULAR ACP

RAPID FIRE SPREAD

FIRE SPREADS
UPWARD DUE TO A
COMBUSTIABLE CLADDING

FIRE BREAKS IN & OUT
THROUGH GLASS

FLAMES
BREAK DOWN
SMOKE BUILD UP

4MANN® FR ACP

RESTRICTED
FIRE SPREAD

FIRE SPREAD
RESTRICTED DUE TO A
FIRE RETARDANT ACP
CLADDING MATERIAL
AND SYSTEM

NO DROPLETS FALLING
DOWN, HENCE AVOIDING
FURTHER SPREAD AND
HAZARD TO PEOPLE

NO SMOKE
& TOXIC FUMES

TECHNICAL

4MANN® FIRE RETARDANT ACP – Class B (As per EN Standards)

APPLICATION : Interior and Exterior

Architectural Applications in Public places, Stadiums, Hospitals, Auditoriums, Museums, Theaters, Malls, Rail coaches, Bus Bodies, Railway stations, Airports, Bus terminals, etc.

PARAMETERS	ASTM STD.	UNIT	4MM
Skin Thickness		[mm]	0.50/0.50
Thickness of ACP		[mm]	4.00
Weight		[Kg/m²]	7.00
Skin Properties			
Alloy	ASTM B209M		AA 1xxx/AA 3xxx
Temper	ASTM B209M		H18 / H24
Tensile Strength	ASTM E8	[N/mm²]	Rm ≥ 140
0.2% Proof Stress	ASTM E8	[N/mm²]	Rp0.2 ≥ 110
Elongation	ASTM E8	[%]	A50 ≥ 6
Coating Thickness	ASTM D7091	μm	27 - 33
Modulus of Elasticity	ASTM E8	[N/mm²]	70,000
Compounds (contain ATH and Oxide Of Mg & Cu)			
Density of Core	ASTM D792	gm/cm³	1.40
Compounds	-----	%	Mineral Filled Non - Combustible / Fire Retardant Core
Fire Properties & Classification			
Classification		**EN-13501-1:2007**	
Fire Behavior		**B**	
Smoke Production		**S1**	
Flaming Droplets		**d0**	
Surface finish			**PVDF Coated**
Pencil Hardness	ASTM D 3363	[HB]	2HB
Gloss (initial value)	ASTM D 523	%	**≥30**
Acoustical Properties:			
Sound Transmission Loss Rw	ASTM E 90	[db]	26
Thermal Properties:			
Heat Transition Coefficient U	ASTM C1363	[W/m²K]	5.53
Linear Thermal Expansion	ASTM D 696	[mm/M/°C]	2.3 (at 100°C)
Continuous Use Temp.	ASTM C1363	[°C]	-50°C to 80°C

*Tolerance Applicable

4MANN® FIRE RETARDANT ACP – Class B1 (DIN 4102:1)

APPLICATION : Interior and Exterior

Architectural Applications in Public places, Stadiums, Hospitals, Auditoriums, Museums, Theaters, Malls, Rail coaches, Bus Bodies, Railway stations, Airports, Bus terminals, etc.

PARAMETERS	ASTM STD.	UNIT	4MM
Skin Thickness		[mm]	0.50/0.50
Thickness of ACP		[mm]	4.00
Weight		[kg/m²]	7.00
Skin Properties:			
Alloy	ASTM B209M		AA 1xxx/AA 3xxx
Temper	ASTM B209M		H18 / H24
Tensile Strength	ASTM E8	[N/mm²]	Rm > 140
0.2% Proof Stress	ASTM E8	[N/mm²]	Rp0.2 > 110
Elongation	ASTM E8	[%]	A50 > 6
Coating Thickness	ASTM D7091	μm	27 - 33
Modulus of Elasticity	ASTM E8	[N/mm²]	70,000
Compound (contain ATH and Oxide Of Mg & Cu)			
Density of Core	ASTM D792	gm/cm³	1.40
Compounds	-----	%	Mineral Filled Non - Combustible / Fire Retardant Core
Fire Properties & Classification			
Classification		**DIN 4102 (Brandschacht Test)**	
Fire Behavior (Average Rest Length of Burning)		**350mm to 450mm with Smoke Temperature 125°C to 170°C**	
Smoke Density		**Smoke Density 10% to 15%**	
Surface Flaming & Edge Flaming for 20 Sec.		**The tip of flame does not reach the reference mark and the filter paper below the sample does not burn**	
Surface finish			**PVDF Coated**
Pencil Hardness	ASTM D 3363	[HB]	2HB
Gloss (initial value)	ASTM D 523	%	**>30**
Acoustical Properties:			
Sound Transmission Loss Rw	ASTM E 90	[db]	26
Thermal Properties:			
Heat Transition Coefficient U	ASTM C1363	[W/m²K]	5.53
Linear Thermal Expansion	ASTM D 696	[mm/M/°C]	2.3 (at 100°C)
Continuous use T			

*Tolerance Applicable

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ALUMINIUM COMPOSITE PANEL
A Technology From Germany

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