

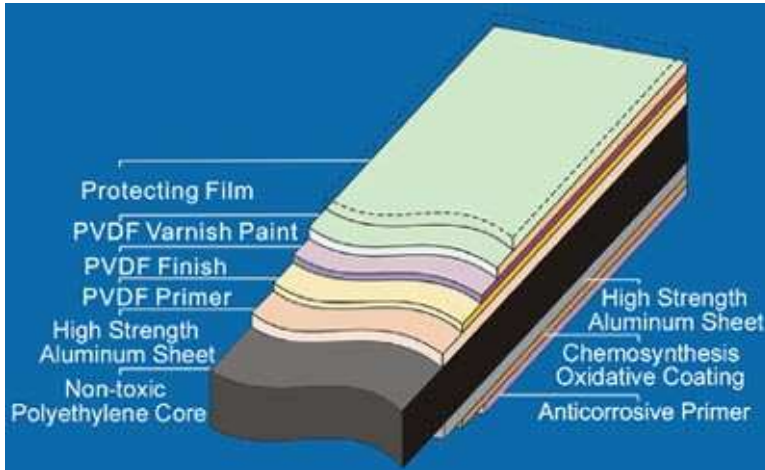


Aluminum Composite Panel

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4. Characteristics Fire-Resistance Aluminum Composite Panel
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Product Attribute

Aluminum Composite Panel (ACP) is made up of three layers, with two layers of aluminum skin on the top and bottom, and one layer of anti-toxic polyethylene material in the middle. Also, both of skin surfaces need to be coil-coated with special paint material like PVDF or PE resin under a specific temperature condition.



Specification:

- 1) Aluminum skin thickness: 0.50x0.50mm, 0.40x0.40mm, 0.30x0.30mm, 0.21x0.21mm, 0.15x0.15mm; 0.12mmx0.12mm
- 2) Width: 1220mm (regular), 1570mm (Maximum);
- 3) Length: 2440mm (regular), and tailored by customers' offers; 6500mm(Maximum)
- 4) Normal color: 31 kinds for ACP and 7 kinds for Granite Grain Panel;
- 5) Standard size:
 - 1220(Width) ×2440(Length) ×3mm (Thickness);
 - 1220(Width) ×2440(Length) ×4mm (Thickness).
- 6) Non-standard sizes and special colors are available depending on customers' offers.

Scopes of Application:

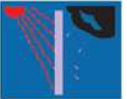
- 1) Constructional exterior curtain walls;
- 2) Decorative renovation for storey-added old buildings;
- 3) Indoors decoration for interior walls, ceilings, bathrooms, kitchens and balconies;
- 4) Advertisement board, display platforms and signboards;
- 5) Wallboard and ceilings for tunnels;
- 6) Raw materials in industrial purpose;
- 7) Materials used for vehicle and boat.

Characteristics



1) High Peeling Strength

The three layers of panel are compounded together by use of high-performance molecular binding film under a specific temperature condition, which will achieve the best level for one of the panel's important features - high peeling strength.



2) Superior Weathering Resistance

By use of SIT J500 based PVDF resin coating, the panel enjoys a high level of resistance to acid & alkali, corrosion and ultraviolet radiation. Even if being exposed directly under some extreme environments like hot sunshine or cold snowstorm, the panel's original appearance will not incur any changes.



3) Light Weight and Easy for Process

This panel is easy to operate because of its light-weight (about 3.5~5.6kg/m²). The operation processes such as cutting, grooving, folding etc. could be easily done just by several simple woodworking tools, because of its characteristic of easy to process. Also, by its application, the flexibility and plasticity of the panels will make it easy and convenient for architectural designers to turn their original design into reality. In this meaning, it saves the cost.



4) Excellent Fire- Resistance Property

Because its core layer is made from anti-toxic polyethylene material, which has a good ability of fire resistance, and two of its skins are both made of aluminum, which is also difficult to burn, thus, the panel is a pretty good fireproof material, and totally meets the demands of fireproofing in national building code.



5) Coating Evenness & Diversified Colors

Due to the application of chemosynthesis treatment and Henkel technology, the adhesive force between paint-coating and panel could be more even. Meanwhile, the choice of color becomes much more diversified, which offers you customers more space to choose as your favorite.



6) Easy for Maintenance

the panel's ability of self-cleaning has been greatly improved. Even though in some area where the pollution is seriously heavy, with help of some neutral detergent, the panel's surface could be cleaned clear easily.

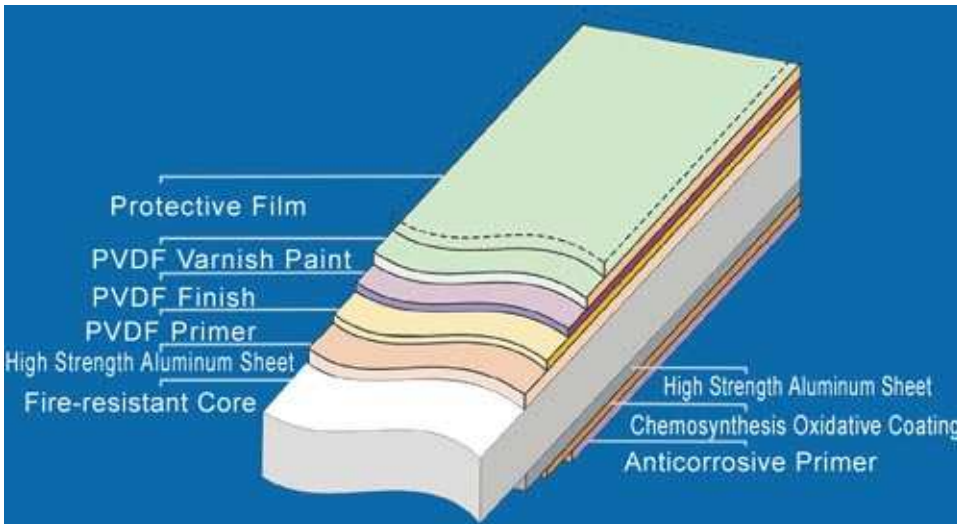


7) Impact Resistance

The impact resistance and toughness of this panel are remarkable. For example, the coating layer will not split even if the panel is being bent to a small angle. What's more, the panel's surface will be guaranteed to keep original for a long time even in an extremely bad weather condition with strong wind and sand.

Fire-Resistance Aluminum Composite Panel

Like the structure of ACP, this brand fire-resistance panel also has three layers, two of which are aluminum skins on the top and bottom, and the core layer is made up of special inorganic nanometer fire-resistance material. Of course, both skin surfaces need to experience coil-coating with special baking varnish.



Standard: With reference to GB/T 17748-1999 standard

Specification:

1) Aluminum skin size:

Thickness: 0.50x0.50mm, 0.40x0.40mm, 0.30x0.30mm 0.21x0.21mm, 0.15x0.15mm;

Width: 1220mm (regular), 1570mm (Maximum);

Length: 2440mm (regular), and tailored by customer's offers. 6500mm (Maximum);

2) Standard size:

1220(Width) x2440(Length) x3mm (Thickness);

1220(Width) x2440(Length) x4mm (Thickness).

3) Normal color:

20 kinds for fire-resistance ACP;

7 kinds for Granite Grain Panel;

Non-standard sizes and special colors are available depending on customer's offers.

Scopes of Application:

- 1) Constructional exterior curtain walls;
- 2) Decorative renovation for storey-added old buildings;
- 3) Indoors decoration for interior walls, ceilings, bathrooms, kitchens and balconies;
- 4) Advertisement board, display platforms and signboards;
- 5) Wallboard and ceilings for tunnels;
- 6) Raw materials in industrial purpose;
- 7) Materials used for vehicle and boat.

Characteristics:

1) Excellent Fire-Resistance Property

the fire-resistance panel owns excellent fire-resistance property, in that the chemical oxygen index of its core layer material could be more than 42. Also, after recognition by National Quality Supervising & Testing Center for



Fireproof Constructional Materials, the level of its fire-resistance property could achieve Grade B1 (difficult to burn), in accordance with sit 8724-1997 standard, No.20011776.

2) Super Facility of Fabrication

the fire-resistance panel has super facility of fabrication, and it could be processed in the same way as ACP, keeping 2-3mm thickness in core layer. The processes such as cutting, grooving, and folding could be done easily just by some simple woodworking tools. As a result, the installation work will become faster and more convenient.



3) Perfect Resistance to Low Temperature

The core layer in ACP is made from such materials as polyethylene, which will begin to be brittle at critical point of -60 degree. Blow that, it will work as a glass. However, the critical point of the core material in fire-resistance panel is -100 degree, which means the panel could be adopted in a more freezing area.



4) High Peeling Strength

Due to its particularities, when the core material is being tied to aluminum skins by high-performance molecular binding film, the chemical reaction happened will generate powerful adhesive force, which is strong enough to achieve super peeling strength. As shown by test results, the peeling strength of the fire-resistance panel is 35kg per 25.4mm, which is beyond that of ACP by 10%. Furthermore, the peeling strength will have not any changes even if the fire-resistance panel is put in and out for 20 times from such an environment as the temperature varying from -50 to 80 degree.



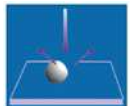
5) Coating Evenness & Diversified Colors

Due to the application of chemosynthesis treatment and Henkel technology, the adhesive force between paint-coating and panel could be more even. Meanwhile, the choice of color becomes much more diversified, which offers you customers more space to choose as your favorite.



6) Impact Resistance

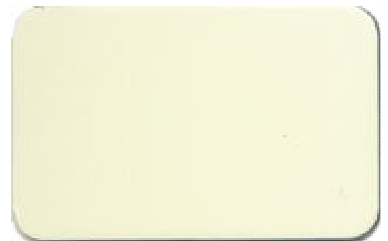
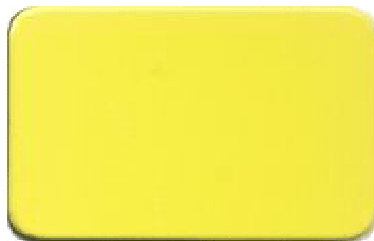
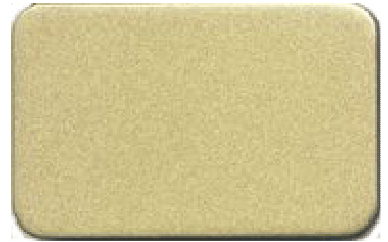
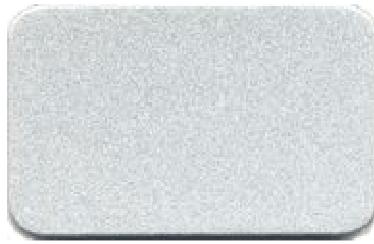
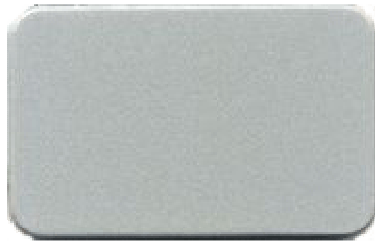
The impact resistance and toughness of the panel are remarkable. For example, the coating layer will not split even if the panel is being bent to a small angle. What's more, the panel's surface will be guaranteed to keep original for a long time even in an extremely bad weather condition with strong wind and sand.



Exact color please refer to actual sample



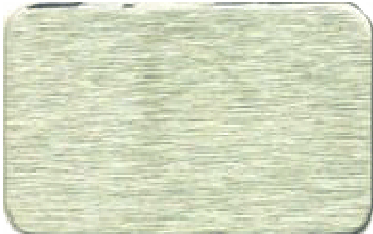
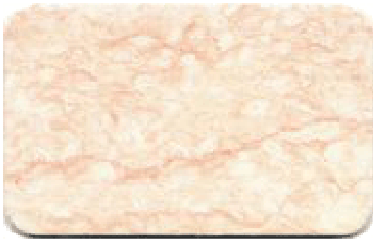
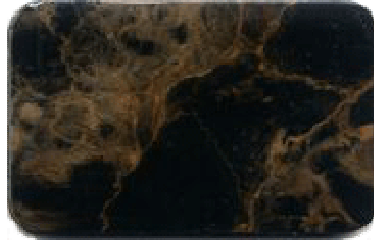
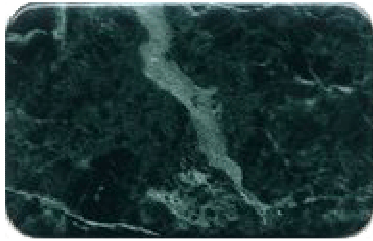
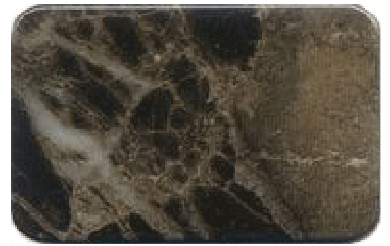
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Characteristics

1) Principal Properties

Item	Test Standard	Unit	Results	
			3mm	4mm
Density	SIT KL25	g/mm ³	1.17	1.38
Face Density		kg/cm ²	3.50	5.55
Shearing Strength	SIT KL 21	Mpa	21.5	30.6
Peeling Strength	SIT KL30	N/mm	5.9	13.8
Bending Strength	SIT KL 70	Mpa	66.2	124
Tensile Strength	SIT KL 23	Kg/cm ²	4.2	4.9
Rate of Elongation	SIT KL 24	%	7.2	10

2) Dent Test by Du-Pont Method (impact resistance)

Weight of Steel Ball (kg)	Height (mm)	Debt depth (mm)	
		Results	
		3mm	4mm
0.30	300	1.8	0.6
0.50	500	1.6	1.3
1.00	300	2.1	1.6
1.00	500	2.5	2.3

3) Mechanical Properties of Skin Aluminum

	ASTM	Unit	-
Yielding Strength	E8	Mpa	170
Bending Elasticity	C393	Mpa	76000

4) Coefficient of Sound Insulation (according to GBJ 5-8)

Center Frequency (HZ)	100	125	160	200	250	315	400	500	630
Coefficient of Sound Insulation (dB)	23	17	19	24	27	28	29	31	32
Center Frequency (Hz)	800	1K	1.25K	1.6K	2K	2.5K	3.15K	-	-
Coefficient of Sound Insulation (dB)	32	34	36	37	38	38	37	-	-

5) Deformation from Wind Pressure (according to GB 7106-88)

Deformation Inapection (L/300)	Positive Pressure	0.2kpa
	Negative Pressure	-0.2kpa
Safety Inspection (3seconds gust pressure)	Positive Pressure	5kpa
	Negative Pressure	-5kpa

Characteristics of Flammability

(File-resistance Aluminum Composite Panel)

The length of testing panel:1000mm



Structural Strengthlexural Strength Design

Strength design is made on the assumption that the bending strength of panel is totally dependent on that of aluminum skins, i.e. if the stress being put on the aluminum skin are in the permissible range of its bending strength, permanent deformation will not occur to the panel. On the basis of this assumption, the yielding strength of aluminum skin will be set as 15.5 kg/mm².

2) Deflection by Wind Load

The deflection of the panels by wind load depends on the panel's thickness, size, and supporting condition etc. Also, the value of deflection under specific condition could be calculated by some simple formulations.

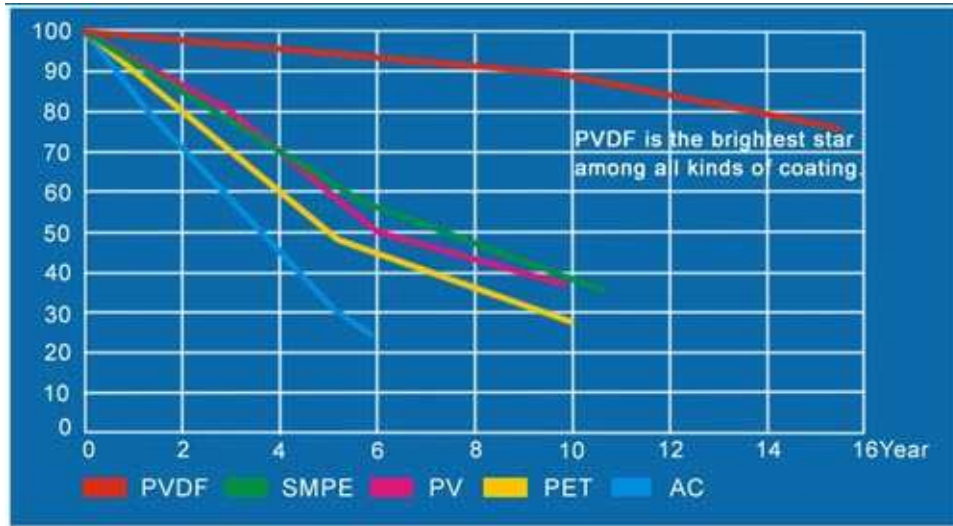
Product Materials

The Decorative Layer of Panel Surface

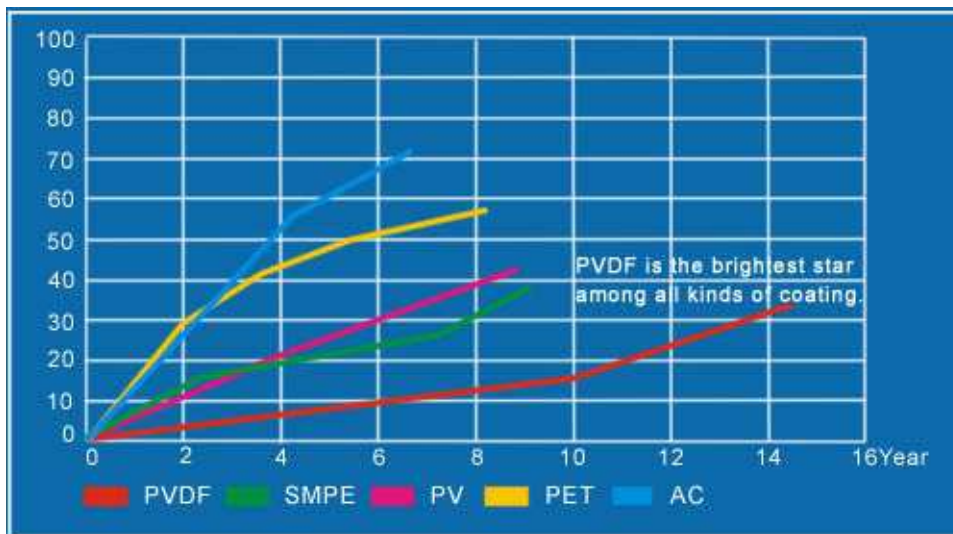
Nowadays the decorative layer for metal substrate mainly includes all kinds of coating, film, surface transformation etc.

1) Paint Coating

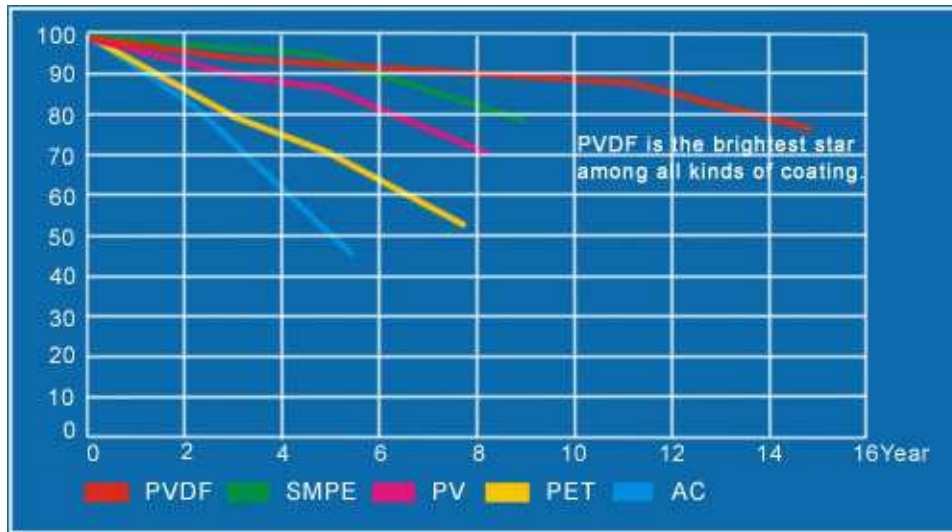
Types: Acryloyl (AC) Silicon Modified Polyester (SMPE)
Polyester (PET) Polyester Amide (PA) SDPE
Epoxide Urethane (PV) PVDF



The Comparison Chart of Gloss Preservation Ratio for Different Coatings



The Comparison Chart of Color Change for Different Coatings



The Comparison Chart of Weathering Change for Different Coatings

Why does PVDF coating possess such excellent performances?

The structure of fluorine-carbon short bond combined with hydrogen bond is the steadiest and firmest structure among all kinds of chemical bond structure. As one of the criteria of judging stability and tightness of chemical structure, the electronegative atom index of PVDF coating could achieve 105 KJ/mole. However, for the normal coating, it is only 83.2 KJ/mole. Also, there is an inorganic material whose molecular structure is SiC₂, which is created by certain chemical method and made of pure inorganic resin. Because the energy of composing Silicon and Oxide is 101KJ/mole, this kind of molecular structure will not be destroyed easily by ultraviolet radiation. Moreover, the other properties of PVDF coating, such as self-cleaning, Incombustibility, environmental protection etc., are still remarkable.

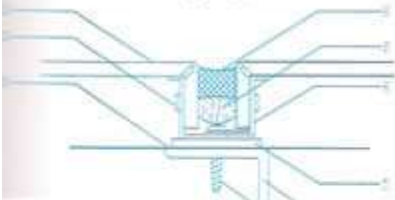
The Coating of The Composite Panel for Curtain-Wall

The higher the content of PVDF in paint, the better the weathering-resistance of the panel, but, the poorer the adhesive force between the coating and base material. Therefore, panel adopts a scientific arrangement in pairs or groups for PVDF coatings. For example, the percent of PVDF in primer paint is quite low, so that the adhesive force created is good enough to make the primer paint stick to the base material firmly. Strictly speaking, it creates a layer thermoplastic PVDF coating, which possesses excellent performance of Mek resistance.

Installing diagram

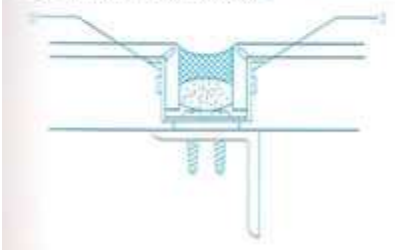
Example of panel type and joint design(A)

Angle aluminum and seal joint (1)



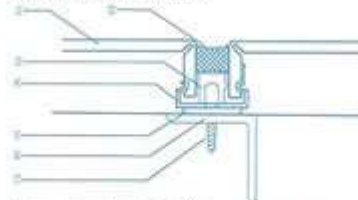
- ①the panel
- ②Aluminum rivet
- ③Angle aluminum
- ④Angle aluminum
- ⑤Sealing material
- ⑥Bach spacer
- ⑦Spacer
- ⑧Angel bar
- ⑨Bullen screw

Angle aluminum and seal joint (2)



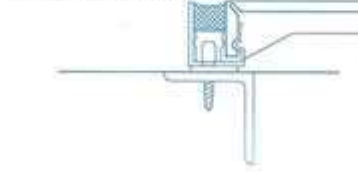
Example of panel type and joint design(B)

Accessories and seal joint (1)



- ①the panel
 - ②Sealing material
 - ③Plastic lining bar
 - ④Accessories
 - ⑤Spacer
 - ⑥Angel bar
 - ⑦Bullen screw
- Above mentioned Accessories are used for low building

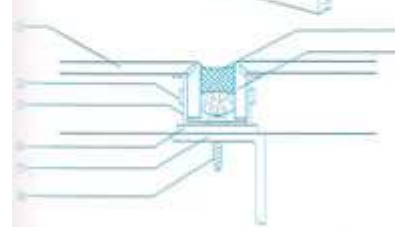
Accessories and seal joint (2)



Example of panel type and joint design(C)



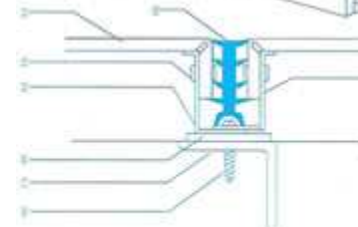
- ①the panel
- ②Aluminum rivet
- ③Angle aluminum
- ④Sealing material
- ⑤Bach spacer
- ⑥Spacer
- ⑦Angel bar
- ⑧Bullen screw



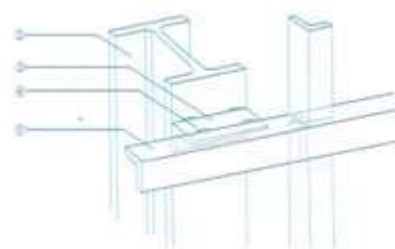
Example of panel type and joint design(D)



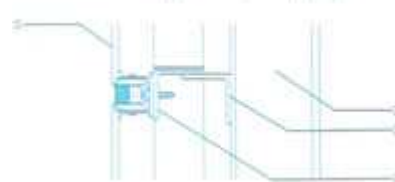
- ①the panel
- ②Aluminum rivet
- ③Angle aluminum
- ④Angle aluminum
- ⑤Gasket
- ⑥Spacer
- ⑦Angel bar
- ⑧Bullen screw



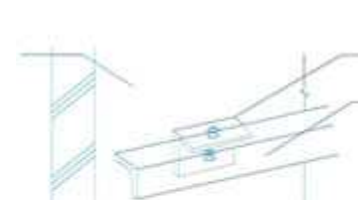
Example of keel structure(A)



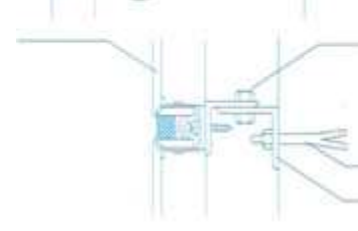
- ①the panel
- ②Bearing strut
- ③Angle support
- ④Welding
- ⑤Angel bar



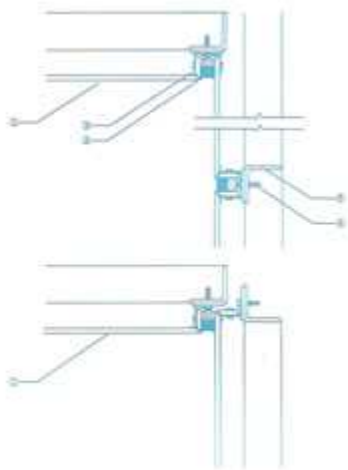
Example of keel structure(B)



- ①the panel
- ②Bearing strut (or wall)
- ③Angle support
- ④Angle aluminum
- ⑤Tapping screw
- ⑥Embedded part

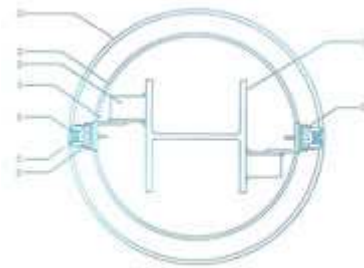


Installation example of internal corner



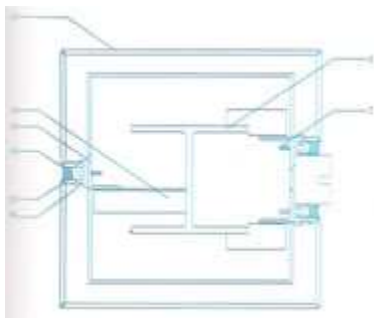
- ①the panel
- ②Sealing material
- ③Bach spacer
- ④Angel bar
- ⑤Bullen screw

Example of column covering



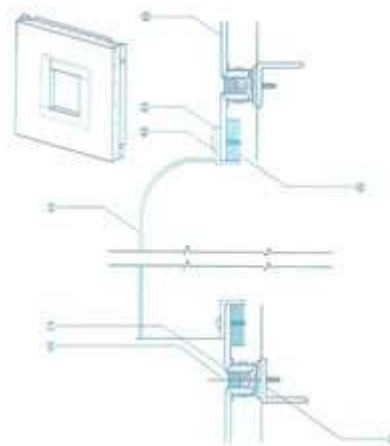
- ①the panel
 - ②Angle support
 - ③Steel plate strip
 - ④Sealing material
 - ⑤Plastic lining bar
 - ⑥Accessories
 - ⑦Bullen screw
 - ⑧Bearing strut
 - ⑨Angel bar
- Above mentioned Accessories are used for low building

Example of strut covering



- ①the panel
 - ②Angle support
 - ③Angel bar
 - ④Sealing material
 - ⑤Plastic lining bar
 - ⑥Accessories
 - ⑦Bullen screw
 - ⑧Bearing strut
- Above mentioned Accessories are used for low building

Installation example of equipment and opening

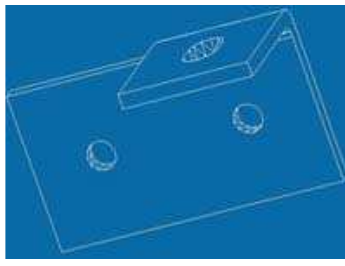


- ①the panel
- ②Seal around
- ③Tape
- ④Veneer
- ⑤Weahtertight covering material
- ⑥Sealing material
- ⑦Bach spacer
- ⑧Bullen screw

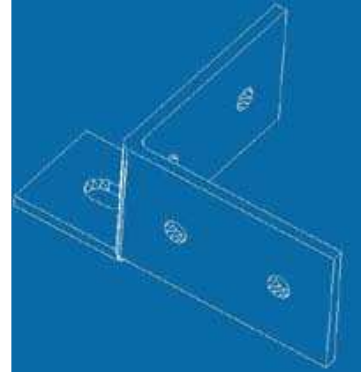
Accessories for installation



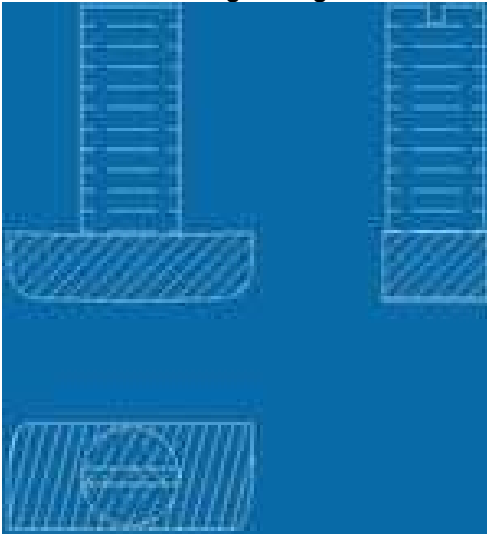
Left Angle Hanger



Center Hanger



Right Angle Hanger



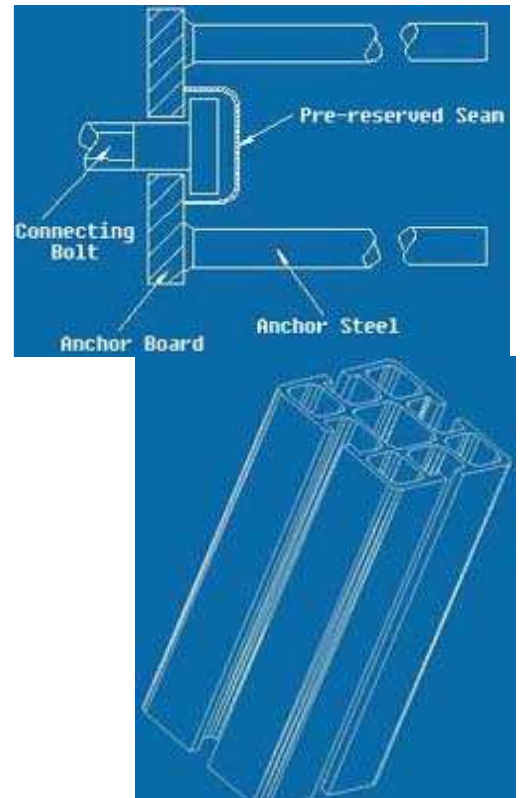
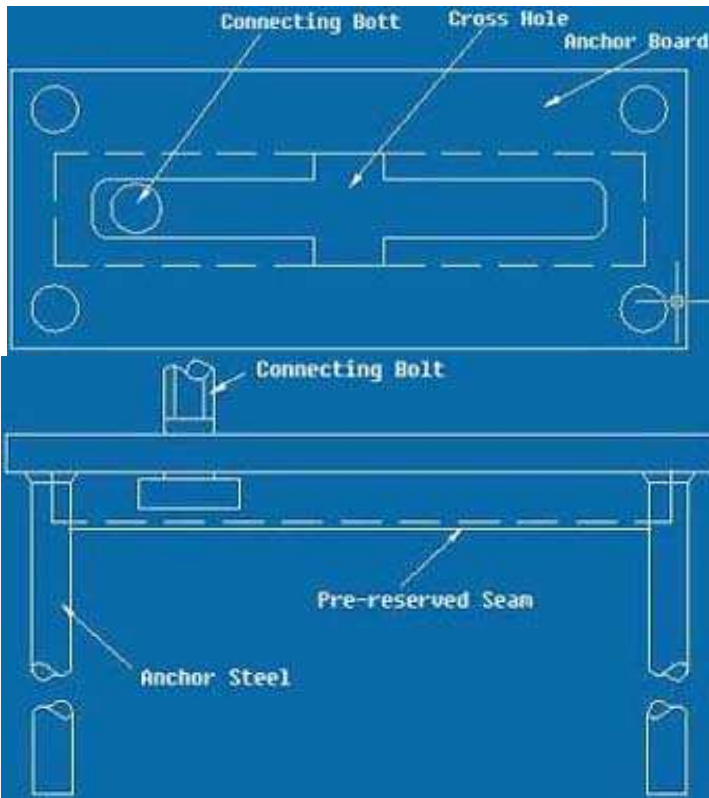
Three Views of Hook Nail



Connecting Fitting of Column



Nylon Pad of Connecting Fitting between Column and Wall



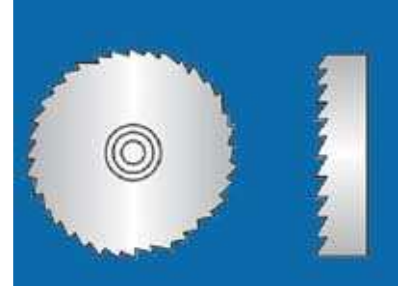
1、 Processing Tools



Special Grooving Machine



Simple Processing Tools



Sawing Tool



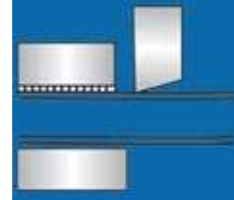
Drilling Tool



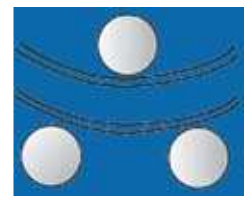
Planer



Cold-Bending Machine



Cutting machine



Cold-Rolling Machine

Processing Tools and Depth of Grooving

- 1) Appropriate processing tools are very important to the processing quality of the panels. For example, the blunt cutter is prohibited to use for panel processing because when it works at high rotating speed, the temperature created on the panel surface will increase up to more than 100°C, which could easily make the panel materials to be molten, as a result, the quality of the finished panels will be impaired to a big degree.
- 2) Please use dentiform saws or some shearing tools to cut panels, instead of the grinding wheel. Also, files should be adopted to polish the cutting edges, because it will not cause a high temperature that will do harm to the coating of panels.
- 3) Note that don't groove so deeply to the panels, in other words, do not damage the aluminum skin at the other side. Also, don't cut off the polyethylene core layer thoroughly when grooving and leave about 0.1-0.6mm thickness.

Production line

We totally owns one high-speed digital control punching lines, one ACP core-layer production line, one chemosynthesis line, one 1600mm width double-coil-coating and double-baking line, one 1350mm width high-precision coating line, one continuous thermal-compositing and sawing-cutting line in 1600mm width, and one continuous thermal-compositing line in 1350mm width.



The Chemosynthesis Line

This line is responsible for cleaning out both lubricative and anti-oxidative oil that are adhered to the material surface during the period of being rolled and other impurities such as silicon, magnesium, iron and copper. We use qualified chemicals and advanced technology from Henkel Co., Germany, to make the surface treatment. By use of this technology, a thin film will be generated to cover the surface with high density, which will contribute to a high adhesive force between the coating and metal roll.



The High-Precision Coating Line

The line is precisely to coat the chemosynthesized aluminum rolls under a sealed and dustless condition by using an advanced multiple-coil-coating reversal high-precision equipment; consequently, the thickness of coating and its appearance could be controlled properly and strictly. Furthermore, the coating could achieve its best condition in all aspects like strengths and abilities etc.

The ACP Core-Layer Production Line

Equipped with the computerized temperature & speed control system, which is endowed with changeable and adjustable frequency speed in vector grade, the line could produce the core-layer materials like PE in a high quality for normal ACP or fire-resistance ACP. And its annual outputs could reach more than 8000 tons.

The continuous thermal composite line

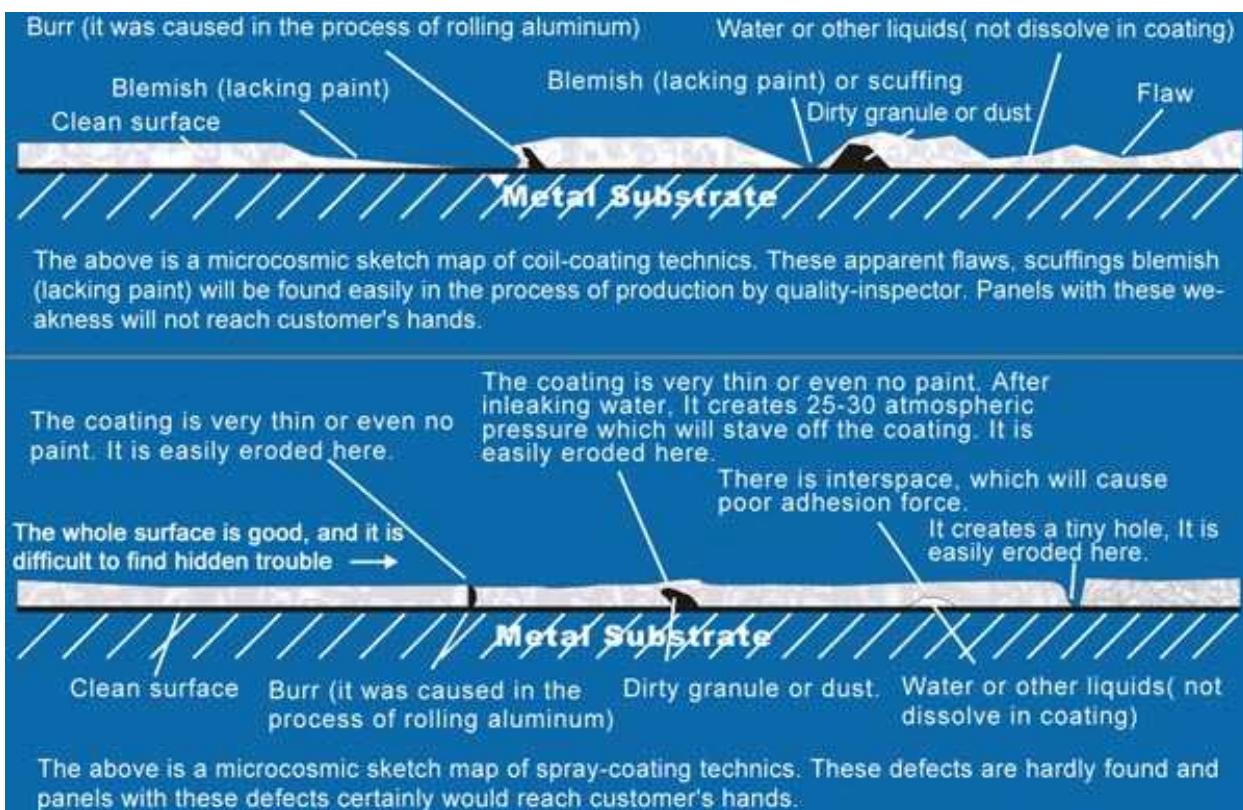
This line could make the three layers of the panel (two skin layers and one core layer) adhere to each other firmly under the help of high-performance molecular binding film through a continuously heating process. The finished panel is smooth and even on surface. Also, depending on this line, we could produce the composite panel with super peeling strength, which is greatly beyond the quality indexes of those panels imported in the same kind.



The Advantages of Coil Coating

1、 High-Precision Coating

The roller has high requirement for the material surface, which means it should be absolutely clean and smooth during the process of coil-coating.



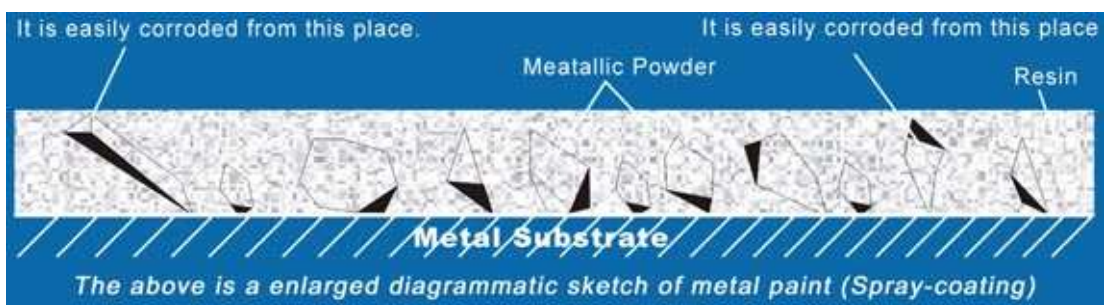
2、 Evenly Coating in High Degree

Because the roller itself is manufactured in a high-precision degree with a tolerance no more than $\pm 1\mu\text{m}$, thus, the coating it produces owns a high degree of evenness, and the tolerance of thickness is between $\pm 1\mu\text{m}$. Also, during the process of coil-coating, all the stress is applied in an even and stable way, which makes coating's microcosmic array be uniform in all aspects. As a result, the visual effect of curtain-wall will become perfectly uniform due to the assemblage of plenty of panels with such coatings. Another important thing is, although the pigment will gradually fade inevitably after a specific period due to the weathering, the color still looks uniform. In other words, the pigment will fade in a unitive pace and the color difference caused could be ignored. However, for other coating methods like spray-coating, the effect of evenness and color difference is far from that of coil-coating. For example, the tolerance of color difference of spray-coating is usually between $\pm 5\mu\text{m}$, sometimes $\pm 10\mu\text{m}$, which will create a very disorderly color scheme to the finished curtain-wall.



3、 More Advantages of Coil-Coating in Metallic Painting

At present, the metallic color coating become more and more popular and is gradually recognized by most of customers. Also, the metallic color pigment is created by adding metallic powder to the resin. Due to the special shape of metallic powder such as polyhedron, only through the coil-coating method, it could be converted and as a result, evenly and regularly distributed in the resin. However, if adopting the method of spray-coating, the metallic powder will always stay on the top of resin, which will make the resin coating very thin and easily to be corroded.



4. Environmental Protection

Because coil-coating technics will not produce paint fog in the process of coating, the efficiency of paint is very high. For spray-coating, it will produce paint fog, which not only contaminate the environment but also wastes the expensive paint.

Composite Curtain-Wall products all adopt coil-coating. We posseses two sets of advanced coil coating production lines.