Technical Construction Files

Date: 2011-03-07

Aluminium Composite Panel

Model:
Blackburns Composite Panel (2mm, 3mm)

According to
89/106/EEC Construction Product Directive

PANEL SUPPLIES EUROPE
50 ELM GROVE, WOBURN SANDS, MILTON KEYNES, MK17 8PS, UNITED KINGDOM

Documents Reference

1.0 CE Certificates

ENTE CERTIFICAZIONE MACCHINE

CERTIFICATE OF COMPLIANCE

CERTIFICATE NR. 110311/PSE139

MANUFACTURER :	
NAME	PANEL SUPPLIES EUROPE
ADDRESS	50 ELM GROVE, WOBURN SANDS, MILTON KEYNES, MK17 8PS - UNITED KINGDOM

WE CERTIFY THE FOLLOWING PRODUCT (S):

PRODUCT	**ALUMINIUM COMPOSITE PANEL**
MODEL	BLACKBURNS COMPOSITE PANEL (2mm, 3mm)
YEAR	2011

REMARK :THIS DOCUMENT HAS BEEN ISSUED UPON A REVIEW OF THE DATASHEETS AND OF THE TECHNICAL CONSTRUCTION FILE. THE APPARATUS IS CONSIDERED TO MEET THE REQUIREMENTS OF THE BELOW STANDARDS, THEREFORE TO FULFILL THE REQUIREMENTS OF THE BELOW LISTED DIRECTIVES.

89/106/EEC	**CONSTRUCTION PRODUCT DIRECTIVE**

SAFETY STANDARDS EN NORMS :
EN10002-1:2001, EN310:1993, EN13446:2002, EN1604:1997, EN 13501-1:2007+A1:2009, EN319:1993, EN ISO 4892-2:2006+A1:2009, EN1602:1997, EN ISO 140-3:1995, EN 12664:2001,REACH

THIS DOCUMENT IS ONLY VALID FOR THE EQUIPMENT AND CONFIGURATION DESCRIBED AND IN CONJUNCTION WITH THE TEST DATA DETAILED ABOVE. NEVERTHELESS THE MANUFACTURER IS NOT EXEMPTED TO PERFORM ALL THE NECESSARY ACTIVITIES BEFORE ISSUING THE DECLARATION OF CONFORMITY. IN CASE THE APPLIANCE IS MODIFIED OR THE APPLIANCE WILL BE EQUIPPED WITH ACCESSORIES NOT SPECIFIED IN THE MANUFACTURER OPERATOR MANUAL, IT IS RECOMMENDED TO GET IN TOUCH WITH ENTE CERTIFICAZIONE MACCHINE FOR EC VALIDITY EXTENSION.

DATE OF ISSUE MARCH 2011

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"EEC PRODUCT CONFORMITY MARK"

THE CONFORMITY OF THE PRODUCT(S), REFERRING TO THE ECM CERTIFICATE NR.

CERTIFICATE NR. 110311/PSE139

MANUFACTURED BY :

PANEL SUPPLIES EUROPE

50 ELM GROVE, WOBURN SANDS, MILTON KEYNES, MK17 8PS - UNITED KINGDOM

IS CERTIFIED BY ENTE CERTIFICAZIONE MACCHINE, WHICH HAS VERIFIED AND TESTED THE COMPLIANCE TO THE APPLICABLE EUROPEAN PRODUCT DIRECTIVE(S) AND STANDARDS :

COMPLIANCE: DIRECTIVE 89/106/EEC

EN NORMS: EN 10002-1:2001, EN310:1993, EN 13446:2002, EN1604:1997, EN 13501-1:2007+A1:2009, EN 319:1993, EN ISO 4892-2:2006+A1:2009, EN 1602:1997, EN ISO 140-3:1995, EN 12664:2001,REACH

EVIDENCE OF THE CONFORMITY IS REPRESENTED BY THE EEC PRODUCT CONFORMITY MARK APPLIED ON THE PRODUCT(S)

SCOPE OF THE ENTE CERTIFICAZIONE MACCHINE EEC PRODUCT CONFORMITY MARK :

The **ECM** EEC Product Conformity Mark demonstrates that the product(s) not only meets the ESSENTIAL Health and Safety Requirements of the above Directive(s), but it is backed by an independent third party testing organization. Yet **ECM** EEC Product Conformity Mark demonstrates that the product(s) meets and exceed the established standards of excellence in supplement manufacture.

PRODUCT :

ALUMINIUM COMPOSITE PANEL

MODEL:

BLACKBURNS COMPOSITE PANEL (2mm, 3mm)

ENTE CERTIFICAZIONE MACCHINE

DR. ANDREA SECCHI, VICE PRESIDENT

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ECM

ENTE CERTIFICAZIONE MACCHINE

EEC PRODUCT CONFORMITY MARK

THE ENTE CERTIFICAZIONE MACCHINE "EEC PRODUCT CONFORMITY MARK" ENDORSED ON THE PRODUCT IS GUARANTEE OF CONFORMITY

ENTE CERTIFICAZIONE MACCHINE
NOTIFIED BODY, ASSIGNED NR. 1282
EEC PRODUCT CONFORMITY MARK RELEASED IN COMPLIANCE TO THE EUROPEAN STANDARDS AND ECM STANDARDS

ENTE CERTIFICAZIONE MACCHINE

EEC PRODUCT CONFORMITY MARK

This is the sample of the Ente Certificazione Macchine "EEC PRODUCT CONFORMITY MARK" as evidence of the Conformity of the Product to the applicable European Product Directive(s) and/or Standards.

For a better MARKET AND CLIENTS VISIBILITY of the Product Conformity we suggest that such a Mark would be endorsed (affixed) on the Product itself as well as on the eventual Packaging, Catalogues, Brochures, Website, Head Letter Paper and so on.....

The "EEC PRODUCT CONFORMITY MARK" is released by ECM against the issuance of the Product(s) Certificate of Conformity.

MARK ISSUED DIRECTLY TO CLIENT :

PANEL SUPPLIES EUROPE

50 ELM GROVE, WOBURN SANDS, MILTON KEYNES,

MK17 8PS - UNITED KINGDOM

Ente Certificazione Macchine - Ente Certificazione Macchine -

ECM

EEC PRODUCT CONFORMITY MARK

CERTIFICATE NR. 110311/PSE139

2.0 EC Conformity Declaration

CE

EC Declaration of conformity

PANEL SUPPLIES EUROPE
50 ELM GROVE WOBURN SANDS MILTON KEYNES UNITED KINGDOM MK17 8PS

TEL: 0044-1392-823016 FAX: 0044-1392-829602

Product Name:
Aluminium composite panel

Model:
Blackburns Composite Panel (2mm, 3mm)

We here declare that the product described is in conformity with the following Directive:
89/106/EEC Construction Product Directive

Moreover following harmonized standards have been applied to the product:

EN10002-1:2001, EN310:1993, EN13446:2002, EN1604:1997, EN 13501-1:2007+A1:2009, EN319:1993, EN ISO 4892-2:2006+A1:2009, EN1602:1997, EN ISO 140-3:1995, EN 12664:2001, REACH

The technical construction files required to demonstrate that the product(s) meet(s) the requirement(s) of the aforementioned directive(s) has been compiled and is available for inspection by the relevant enforcement authorities.

Issue place:

Company stamp and Signature of authorized personnel

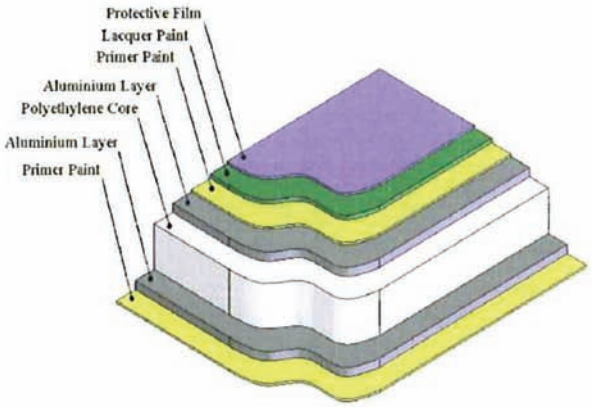
3.0 Product General Description

Aluminium Composite Panel material (ACP) is formed by laminating a central core of thermoplastic material with an outer skin of Aluminium sheet. The process bonds the Aluminium to the central core in such a way that the resultant panel is exceptionally rigid and dimensionally stable for its weight.

The material is generally supplied with an Aluminium finish but is also available coated with a hard-wearing polyester film in a variety of primary colours.

The main characteristics of ACP are:

- Outstanding weather resistance.
- Class 0/Class 1 fire retardant.
- Erosion resistant.
- No colour fade in comparison to some plastic products.
- Dimensionally stable. Does not expand and contract under extremes of temperature.
- Wide range of colours and finishes available nationwide.
- Amazing rigidity at an incredibly light weight.
- Incredibly flat smooth surface.
- Easily cut, folded and formed. It really isn't as difficult as others make out!
- Provides your clients with a quality product guaranteed to last that will put you leagues in front of people who use cheaper plastic materials.
- Can be finished in many ways, from the application of vinyl, screen printing, digital printing and the application of paints for traditional sign makers.



The panel can be used in the following applications:

- Sign making and Out of Home Media.
- Shop Fitting and Design.
- Manufacture and Point of Sale Displays.
- Trade Stand Designs.
- Transport.
- Partitioning, Wall Linings and Suspended Ceilings.
- Industrial Applications.

4.0 User Instructions

Safety

Normal health and safety precautions practiced in any fabricating environment should be used when fabricating ACP Material. Goggles or other face protection, as well as hearing protection and gloves should always be worn.

ACP FR (fire resistant) core material may produce fine airborne particles when cut or routed, and we recommend breathing protection be worn during these operations.

MSDS for ACP is available from our sales offices and dealers on request.

Packaging

Heavy duty masking, nominally 80 microns with ultra violet barrier, is available to help protect the panel finish during fabrication and installation.

Although the strippable masking is UV stabilised, it should be removed as soon as possible after installation, especially in the case of architectural panels exposed to sunlight and weather.

Storage

When storing unpacked ACP observe the following guidelines:

- To prevent warping or bending, place it horizontally on pallet or other stand.
- Avoid stacking ACP of different sizes together, as the surface or panel can be scratched by the edges of the smaller pieces.
- Preferably, store them by size in racks.
- If storing panels by leaning them against a rack as shown below, lay a rubber mat underneath and lean the ACP against the fixed back-up material.
- ACP is packed in wooden crates and can usually be stacked up to four crates high.

Sawing

Sawing ACP panels is a relatively easy process that can be done with ordinary commercial metal and woodworking equipment. Saw blades and router bits are available through independent distributors who handle cutting tools.

Prior to processing large quantities trial saw cuttings should be done to evaluate both the tool working conditions and the recommended cutting speeds. For marking the panels the use of a soft pencil is adequate. Hard marking tools should be avoided as they can fracture the Aluminium surface. The chips formed during saw cutting should be taken away with compressed air. Due to the nature of the ACP material it is best to move the saw blade rather than the material as no scratch will remain on the panel. If good saw cutting practices are applied and recommendations followed the result should be clean cuts with little bur. If despite following the recommendations, ragged cuts are produced check the following causes; poor tool support, tool vibration, blunt cutting edges, high frictional heat at the cutting edge.

As ACP has low thermal conductivity it cannot be cooled easily with compressed air or any other means. Thus it is recommended to select the tool geometry and cutting conditions in such a manner as to minimize the frictional forces developed at the cutting point and keep the resulting heat at a low level.

Saw cutting can be accomplished with the following cutting equipment...

Panel Saws

Panel saws provide an effective method of cutting. These saws whether standard equipment or custom made, perform well and have the added advantage of space savings. If a panel saw is to be used as production equipment, an industrial model should be purchased in order to obtain adequate cutting tolerances and increase the longevity of the equipment.

Multiple Operation Rip / Grooving Saws

In high production operations, equipment that is capable of performing more than one operation with a single pass through the machinery may be used. This equipment can make multiple saw cuts (sizing the panel) and V-Grooves (rout) at the same time

Table Saws

Table saws are not recommended for big sheets.

Portable Circular Saws

Cutting ACP with portable circular saws is another effective method. As mentioned, this equipment should also be production/ industrial type equipment.

Jig Saws

Jig saws work well for cutouts. Care should be taken with portable jig saws to prevent damage to the ACP material surface. More than one sheet can be cut at a time by stacking panels.

If center cutting (i.e. letter cutouts) is required, it may be placed under the material with the blade cutting in to the foam.

The sheets may be clamped or secured with the double-faced tape for the cutting operation. When clamping between jaws, protect the panel surface against damage.

Blade Recommendations: Consult table below for recommended blades and cutting speeds for various saw types

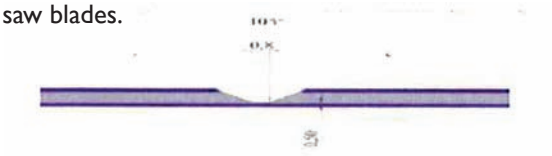
Working Method	Cutting Material	Blade or Band Geometry	Tooth Geometry	Max. Cutting Speed	Max. Cutting Feed
Circular Saws	Carbide tipped or high-speed Steel	20 x 35 mm blades with maximum number of carbide teeth available designed for cutting nonferrous material. The blade should be ground thinner from the rim towards the center to prevent pinching	Angle or circular tooth, alternate bevelled, triple ground. Tooth gap wall rounded. Chip angle: 5° to 15°. Clearance angle: 10° to 30°. Tooth spacing: 4mm to 25mm, fine spacing preferable.	5500 RPM	40mm/sec
Band Saws	Tempered spring strip Steel	Thickness: 0.8mm to 1.2mm. Width: 15mm to 25mm. Use racket or straight set.	Skip teeth, designed for nonferrous and ferrous materials (light metals and plastics). Tooth spacing: minimum 4 teeth per cm.	10000 RPM	25mm/sec
Reciprocating Saws	High speed Steel	Thickness: 0.8mm to 1.2mm Width: 5mm to 15mm	Hook or circular tooth with alternate angles, set or waved. Tooth spacing: 2mm to 6mm		10 mm/sec

Routing and Folding

ACP can be routed by using conventional equipment (horizontal and vertical routing machines). For accurate and precise manual folding of the ACP composite panels, resulting in a good finish, we recommend to route the rear side of the panels and extract the Aluminium sheet and a part of the polyethylene core (2.5mm thick for V groove). Normally the panel is grooved and folded 25-70mm from the edge. In order to route ACP panels the following mechanical equipment is necessary...

Vertical Panel Saw

Equipped with specially shaped routing saw blades.



The equipment needed is the same vertical saw as the one used for the cutting, but with a different saw blade and relevant equipment for adjusting the routing thickness.

Exactly as with the cutting process with the vertical saw, vertical, horizontal or even angular on the axes of the panel routing can be made provided that the ACP panels are placed. The use of a chip collector is essential.

Portable Circular Saw

A portable circular saw equipped with a suitable routing disc can be used only for a limited number of processings. Note that special care should be given to the stability of the portable circular saw during the processing of the material, as well as the precision of the routings with the help of the chosen guided system.

Hand operated router with routing bits

These tools consist of routers that are available in the market and are used for wood processing. If they are equipped with special routing bits – carbide tipped cutter – the hand operated router can be used for a limited number of processes. In this case the stability of the tool and the guide system considerable affect the quality of the routing.

Work directions: For shape elements with a radius between 2 to 7mm proceed as follows...

First a V shaped or rectangular groove is routed by a milling cutter on the onside of the fold, ensuring 0.3 to 1.00mm of core material is left on the lower cladding sheet. The shape of the groove and its respective depth determines the folding radius. Note that smooth bending (shape forming of elements) cannot be obtained without uniform thickness of polyethylene remaining.

Grooving equipment

For processing small quantities of panels a router and trimmer can be used. For processing large volumes of U-grooving as standard industrial production then a circular saw and grooving cutter are needed along with a lifter.

Technical characteristics of carbide saw-tip: Outside diameter: 305 / No of teeth: 24 / RPM: 3000 to 5000

Carbide Saw

By routing only one side, ACP can be bent either upward or downward to create an inside or outside corner.

When a U-groove is bent at 90° angle the bending radius of the final product will be 3-3.5mm and the element will elongate by 0.5 to 1mm. As such the original panel should be cut shorter by that proportion.

Corner Cutting, Notching

Two methods are normally used for cutting out corners to allow the forming of a cassette.

Punching

This technique is the most productive, with the corners being cut out and the corner fastening hole being put in in a single operation.

Wood Chisel

A sharp hammer blow to a wood chisel allows you to cut out the small thickness at the bottom of a routing groove with no difficulty. The wood chisel must be wider than the part to be cut out. With a little experience, good clean cuts can quickly be made.

Curving

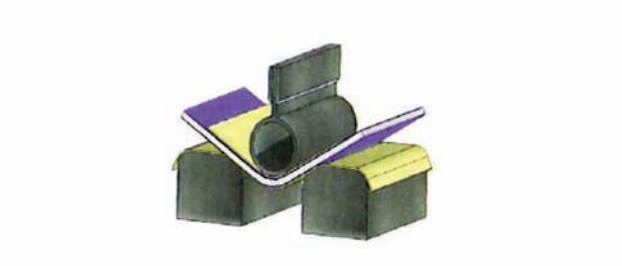
The minimum bending radius for ACP without routing the back skin is fifteen times the thickness of the panel being curved i.e. 4mm = 60mm minimum radius. ACP can be cold formed in a pyramid roller, a press brake or over a clamped pipe. The process is similar to the forming of Aluminium; however, due to the sensitive surface, care should be taken to ensure rollers are clean, smooth and free of defects to avoid damage to the surface.

Pyramid Roller

As an extra precaution a film should be used between the panel and the rollers to further protect the panel surface, do not pinch the ACP between the rollers. Roll the panel 3° to 5° tighter to allow for a small amount of Spring back that will occur. Once the sheet is curved, however, it will remain curved.

Press Brake

When forming with a press brake, use a top doe (tubular) with the radius desired and open the bottom die (jaws) approximately two times the thickness of the material plus film wider than the top die. The lower die should always have a protective pad of not less than 3mm film. Some adjustment of the lower jaws may be necessary to allow for varying bending properties between anodized and painted finish and for varying thicknesses. The radius of the top die will be the approximate inside radius of the finished panel.



Bending over a Clamped Pipe

ACP may be formed over a pipe of the proper diameter that is securely clamped to a work table. A hinged 'leaf' attached to the end of the table will bend the material easily.

Drilling

ACP can be drilled with standard twist drills used for Aluminium and plastics.

Working Specifications:

- **Drill bit:** Twist drill, high speed Steel
- **Tip angle:** 100-140 degrees, or counter-bore grind with centering tip
- **Cutting speed:** 164 RPM to 984 RPM
- Quick removal of chips can be achieved by a high RPM, slow feed speed and occasional lifting of the bit

Joining

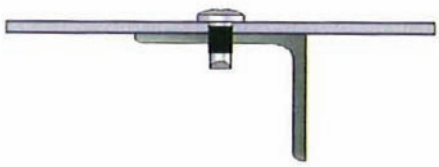
A variety of different fasteners are used to fabricate and install ACP panels. Structural adequacy and selection of these fasteners are the responsibility of qualified engineers and in most instances where architectural panels are used, certified calculations will be required by the Building Official. You may successfully use specific fasteners for panel load testing purposes in obtaining building code recognition. Please find below some important general information about joining techniques.

Use the following guidelines when other elements come in direct contact with the surface of ACP Material:

- **Acceptable joining element materials:** Aluminium, plastic, Stainless Steel, plated or coated Steel with Cadmium, Zinc or Aluminium
- **Unacceptable joining element materials:** Copper, Brass, Bronze, Iron, raw Steel

Unacceptable materials cause corrosion of joining surfaces due to electrolysis of dissimilar materials. Therefore use 'heavy' or 'red' materials only with an electrically insulating intermediate layer. When joining elements are to be anodized, assemble the materials after the anodizing process. Proper consideration should be given to the thermal expansion characteristics of ACP Material when using any of the joining techniques.

Pop rivets are often utilized to attach Aluminium clip angles and other structural or ornamental elements to ACP. Because the rivet body will be in he contact with the Aluminium skins of the panel, it is recommended that either Aluminium or Stainless Steel rivets be used to avoid dissimilar metals contacting. Ultimate shear and tensile strengths of various rivets are available from the rivet manufacturer. Please be advised that some building code jurisdictions do not endorse the use of pop rivets for structural connections.



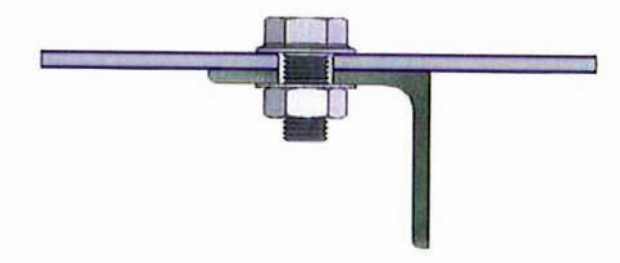
Screws

Screws are also used to perform many of the same applications as rivets. Stainless Steel screws are industry standard and are appropriate to avoid corrosion and dissimilar metal contact. Because screws are customarily installed through pre-drilled holes and because the ACP Aluminium skins are nominally 0.5mm thick, it is recommended that sheet metal screw thread type fasteners be used, especially when the screw is under tension load and this load is resisted by the Aluminium skins. Occasionally, ACP is face fastened directly to supports or sub-grids. The type of thickness if the support metal, as well as the applied load, will dictate the size and thread type of the correct fastener.

Testing is advisable to determine the performance of any fastening system.

Through bolts

Provide an excellent way to join ACP panels to other ACP panels, or to other elements. Galvanised, Stainless Steel or Aluminium bolts, nuts and washers should be used to avoid dissimilar metal contact. Caution is recommended in tightening the nut onto the bolt. Because the plastic core material is compressible, over tightening can deform the metal skins. Use the lock nuts or double nuts with washers to prevent the nut from loosening over time.



Welding

This method is frequently used to assemble ACP panels. The filler rod and the polyethylene core are welded together after heating by a jet of hot air projected by an electrically heated welding gun.

For good quality welding, you need:

- Good preparation of the edges to be welded together
- Adequate filler rod quality
- A good welding speed
- Pressure evenly applied
- Clean hot air
- An appropriate temperature

Welding by the to-and-fro method:

Hold the filler rod at a right angle whilst exerting regular pressure on the rod, make to-and-fro B-B (non-circular) movements. The filler rod and the edges to be welded must be heated in a similar way.

Welding using a high-speed nozzle:

Normal hot air guns fitted with a removable high-speed welding nozzle allow the edges to be welded and the filler rod to be heated at the same time. This makes for better quality welding. The filler rod is pushed by the constant pressure of the high-speed nozzle, and is therefore pressed between the edges to be welded.

Preparation of the edges to be welded:

- **Butt welding:** The edges must be bevelled,
- **Corner assembly:** Only one of the panels is bevelled.
- **T-assembly:** Remove the narrow strip of metal skin to free the areas to be welded.
- **Welding of a fold:** Bevel the edges to be welded first of all using a shaped milling cutter.

The polyethylene core oxidizes relatively quickly once exposed to the air. It must be welded at the most 24 hours after it is bevelled. After it has cooled, it is possible to remove the welding flash using a knife or scraper. We recommend that this operation be carried out in a clean, oil and water-free area.

The specific qualities of the filler rod are:

- Polyethylene low density
- **Colour:** Unpigmented
- **Density:** 0.9g/cm^3
- **Diameter of rod:** 3, 4 and 5mm
- Immediately before welding, remove the outer layer of oxide from the filler rod.

Adhesive bonding

In addition to structural adhesives, double face tape can be used for the fastening of ACP on flat surfaces such as wall, ceiling, furniture coverings etc. the use of double face tape is for temporary adhesion.

Extreme care should be given when selecting the adhesive so as to ensure it is chosen according to the environmental conditions. It is important that the manufacturer is consulted prior to the usage of adhesive for further instructions.

The substrate surface should be clean before the application of the structural adhesive.

Off-line Coating:

ACP can be off-line coated, if necessary. It is advisable to follow instructions as specified by the manufacturer of any paints to be used.

For off-line coating observe the following guidelines:

- Surface should be lightly abraded to provide a better coating surface.
- The surface should then be cleaned of all contaminates i.e. dust, dirt and oil etc. A soft cloth with a non-petroleum based solvent (e.g. rubbing alcohol) should be used to clean the surface area.
- Curing should be done at room temperature since temperatures above 175°F can cause deformation of the ACP panel.

Screen Printing

Printing can be done on ACP with an epoxy base or urethane base two-part type ink/paint. When selecting an ink, confirm its weather ability and adhesion with the ink manufacturer. It is recommended to test the ink's adhesion on the surface of the ACP before production.

For printing on ACP observe the following guidelines...

Remove all dust and dirt on the surface of the ACP. Oily dirt causes splintering, splitting or other defects of the paint. It must be completely removed with a soft cloth dipped in alcohol, N-hexane, etc. If storing or drying is not proper, the adhesion or other performance may be adversely affected. Therefore, observe the storing condition of each paint as specified by the manufacturer. Since storing in high temperature may cause deformation, keeping the storing temperature under 175°F and hold ACP horizontally.

Cleaning

The cleaning of ACP surfaces can be generally described as wall cleaning.

While ACP may in fact be used in a variety of applications and design elements, there is little to distinguish the process from more traditional types of wall cleaning. The most common soils to be removed from ACP surfaces are common dust, dirt and other airborne particulates. In the case of exterior surfaces, various hydrocarbons from airborne exhaust are also likely to need removal. It would also be possible that surfaces could be contaminated with synthetic hydrocarbons from other exhaust: synthetic grease, oil, hydraulic fluids or lubricants or stains from vegetation like plant or animal matter. Material Compatibility:

ACP is an extremely durable material that has been designed to withstand significant exposure to environmental conditions. It is unlikely to be compromised by any cleaning process that would conceivably be used on the material. However, in the interests of maintaining the finish of the material, the prudent user will select products with a pH of 10 or less and which do not contain bleaches, ammonia or caustic ingredients such as sodium hydroxide, potassium hydroxide or sodium metasillicate. It is also recommended that users avoid abrasive materials or tools such as scouring powders, fiber pads or brushes.

Cleaning Method: We recommend a 4-step cleaning method...

1. Flush ACP with water from a hose.
2. Wipe lightly with a soft cloth
3. Use pressure washer.
4. Use detergent in a powder wash or with a soft cloth for hand wiping and flush with water.

5.0 Quality Control System

In order to ensure the conformity of the series production, our company also has taken the related procedures mentioned below:

1. The complete technical construction file (TCF) has been established before applying for the CE marketing certificate.
2. Carry out the inspection for parts and components according to the TCF before the assemblies of the series production, the QC engineers have to check and inspect the technical specifications and intended functions of the parts and components to ensure the correct use of them according to the contents of the TCF and principle described in the related technical information.
3. Carry out the inspection & testing for the products before packing the products, the QC engineers have to do the necessary inspection and testing to ensure the conformity of related requirements
4. Carry out the inspection for the packing
5. Provision for the change of the design
6. Provision for the quality assurance

6.0 List of the Applied Norms

Norms number	Description
EN10002-1:2001	Metallic materials – Tensile testing
EN 310:1993	Wood-based panels. Determination of modulus of elasticity in bending and of bending strength
EN 13446:2002	Wood-based panels. Determination of withdrawal capacity of fasteners
EN 1604:1996	Thermal insulating products for building applications. Determination of dimensional stability under specified temperature and humidity conditions
EN 13501-1:2007 +A1:2009	Fire classification of construction products and building elements. Classification using test data from reaction to fire tests
EN 319:1993	Particleboards and fibreboards. Determination of tensile strength perpendicular to the plane of the board
EN ISO 4892-2:2006 + A1:2009	Plastics. Methods of exposure to laboratory light sources. Xenon-arc lamps
EN 1602:1997	Thermal insulating products for building applications. Determination of the apparent density
EN ISO 140-3:1995	Acoustics. Measurement of sound insulation in buildings and of building elements. Laboratory measurement of airborne sound insulation of building elements
EN 12664:2001	Thermal performance of building materials and products. Determination of thermal resistance by means of guarded hot plate and heat flow meter methods. Dry and moist products of medium and low thermal resistance

7.0 General Test Report

Performance Test		
Clause	**Requirement - Test**	**Result**
Density	The test was determined according to EN 1602. Measure the linear dimensions of test specimens. Calculate the volumes (V) of the test specimens from these measurements. Weigh each test specimen and record its mass (m) in kilograms. Calculate the apparent overall density (p) using the equation: p=m/V	Density range: 1143 kg/m^3 (3mm) 1384 kg/m^3 (2mm)
Tensile Strength	The test was determined according to EN 10002-1. The specimen was only the Aluminium sheet. Machined the specimen according to the standard. The test rate was 2MPa/s. Record the tensile strength and elongation at break	Tensile Strength: 149MPa Elongation: 10.3%
Flexural Strength	The test was determined according to EN 310. The modulus of elasticity in bending and bending strength are determined by applying a load to the centre of a test piece supported at two points. The modulus of elasticity is calculated by using the slope of the linear region of the load-deflection curve. The bending strength of each test piece is calculated by determining the ratio of the bending moment M, at the maximum load Fmax, to the moment of its full cross section. Series of both transverse and longitudinal test pieces are required.	Bending strength: Transverse: 55.1MPa Longitudinal: 52.8MPa Modulus of elasticity Transverse: 9804MPa Longitudinal: 9029MPa
Bond strength	The test was determined according to EN 319. Place the testing assembly in the grips and apply a force until rupture occurs. The load was applied at a constant rate of crosshead-movement throughout the test. Record the maximum load sustained by the test piece. The strength perpendicular to the plane of the board was calculated according to the following formula F=Fmax/(axb) FMax is the breaking load; a, b is the length and width of the test piece.	Bond strength: 6.91MPa

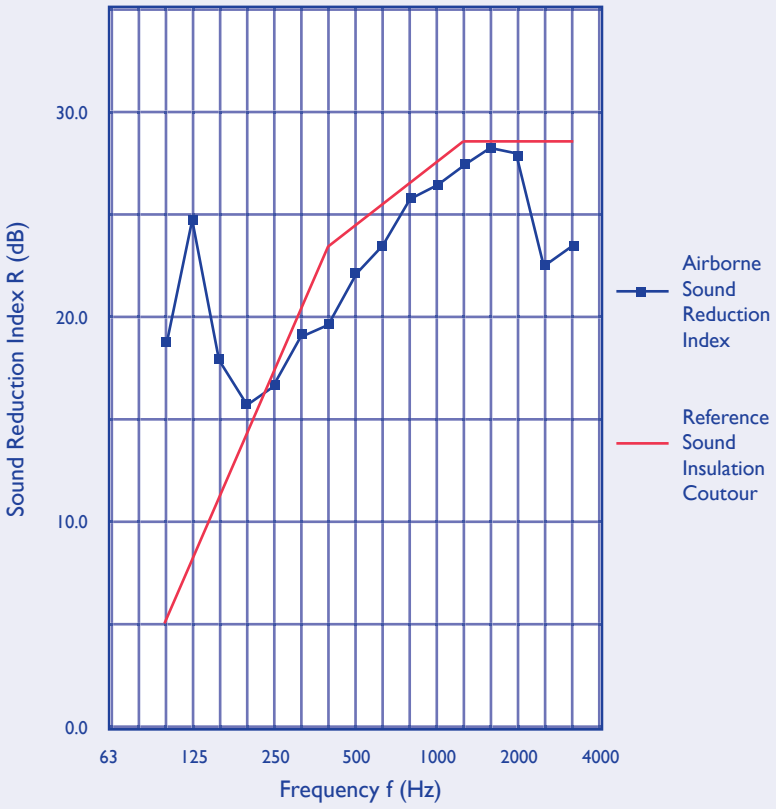
Performance Test		
Clause	**Requirement - Test**	**Result**
Resistance to fixing	The test was determined using EN 13446. Place the test piece in the test jig, ensuring the application of the withdrawal force was along the axis of the fastener. The load was applied at a consistent rate of crosshead-movement throughout the test. Measure the maximum load and record the result. The withdrawal parameter F was calculated according to the following formula: F=Fmax/(dxlp) Fmax is the maximum withdrawal load lp is the depth of penetration fastener d is the diameter of fastener	Withdrawal capacity: Edge of withdrawal: 6.60MPa Surface withdrawal: 5.10MPa
Durability	The test was determined according to EN 1604. Condition the test specimens at 23°C±2°C, 50%±5% relative humidity. Determine the initial length, width and thickness in the same atmosphere. Expose a set of test specimen to these conditions. Low temperature: -30°C±3°C High humidity: 20°C±2°C, 90%±5% relative humidity The duration of exposure was 24 hours. Determine the final length, width and thickness of the test specimens. Calculate the dimensional changes, $\Delta\epsilon_l$, $\Delta\epsilon_b$, $\Delta\epsilon_d$ in percentage from the individual measurements.	Low temperature: $\Delta\epsilon_l$: -0.1% $\Delta\epsilon_b$: - 0.1% $\Delta\epsilon_d$: -1.6% High humidity: $\Delta\epsilon_l$: 0.0% $\Delta\epsilon_b$: 0.0% $\Delta\epsilon_d$: -0.8%
Artificial accelerating weathering	The test was determined according to ISO 4892-2. Expose the specimens and the radiometer continuously run. The radiant flux was 60W/m^2 between 300nm and 400nm (0.51W/m2nm at 340nm). The weathering cycle consisted of humidification period of 18 minutes and a drying period of 102 minutes at a black-standard temperature of 55°C and 50% relative humidity. The overall weathering time was 300 hours.	No visible deterioration

<table>
<tr><th colspan="3">Performance Test</th></tr>
<tr><th>Clause</th><th>Requirement - Test</th><th>Result</th></tr>
<tr><td>Thermal Conductivity</td><td>The test was determined according to EN 12664.
By using the heat flow apparatus, the density of heat flow rate, heat flow rate, and the metering area that the heat flow rate crosses were measured; and the temperature difference across the specimen was measured by temperature sensors fixed at surfaces in contact with the specimens. Then thermal conductivity was calculated from measured density of heat flow rate, heat flow rate, metering area and temperature difference.</td><td>Thermal conductivity:
0.117W/mK</td></tr>
<tr><td>Reaction to fire</td><td>The test was determined according to EN 13501-1.
<table>
<tr><th colspan="2">Item</th><th>Requirement (Class B)</th><th>Result</th></tr>
<tr><td rowspan="3">SBI Test</td><td>Fire Growth Rate Index 0.2MJ,W/s</td><td>≤120</td><td>104</td></tr>
<tr><td>Total Heat Release within 600s, MJ</td><td>≤7.5</td><td>3.2</td></tr>
<tr><td>Lateral Flame Spread</td><td>< Edge of Specimen</td><td>< Edge of Specimen</td></tr>
<tr><td rowspan="2">Smoke Production</td><td>Smoke Growth Rate s1, m^2/s^2</td><td>≤30</td><td>7</td></tr>
<tr><td>Total Smoke Production with 600s s1, m^2</td><td>≤50</td><td>50</td></tr>
<tr><td colspan="2">Flaming Droplets / Particles d0</td><td>No flaming droplets/particles occur within 600s</td><td>No flaming droplets/particles occur within 600s</td></tr>
<tr><td>Ignitability Test</td><td>Exposure = 30s, flame spread within 60s, mm</td><td>≤150</td><td><150</td></tr>
</table></td><td>Class B-s1, d0</td></tr>
</table>

Performance Test

Clause	Requirement - Test	Result
Sound Transmission	The test was determined according to ISO 140-3. Sound source: Pink noise; Environment: Source room volume 62m³. Receiving room volume 99m³. Air temperature 12°C. Air humidity 51%	The single-number rating Rw of the test specimen in such project description is 24dB.

Parameter	Sound Reduction Index R(dB)					
Frequency (Hz)	100	125	160	200	250	315
Value (dB)	18.8	24.8	18.5	15.5	16.5	19.3
Frequency (Hz)	400	500	630	800	1000	1250
Value (dB)	19.6	21.9	23.5	25.8	26.2	27.1
Frequency (Hz)	1600	2000	2500	3150	4000	5000
Value (dB)	27.7	27.5	22.3	23.3	/	/



Performance Test

Clause	Requirement - Test	Result
Release of dangerous substance	The test was determined according to REACH. By a combination of X-ray fluorescence spectroscopy, inductively coupled argon plasma spectrometry, gas chromatography and gas chromatography-electron capture detected.	According to specified test processes, content of all substances of very high concern (SVHC) in candidate list promulgated by European Chemicals Agency (ECHA), which are defined in article 57 of regulation (EC) No.1907/2006 (REACH Regulation), are less than 0.1% (w/w) in submitted sample.

Testing Item	Result (%(w/w)) per Tested Product
Anthracene	< 0.1
4,4' - Diaminodiphenylmethane	< 0.1
Dibutyl Phthalate (DBP)	< 0.1
Cobalt Dichloride*	< 0.1
Diarsenic Pentaoxide*	< 0.1
Diarsenic Trioxide*	< 0.1
Sodium Dichomate*	< 0.1
5-Tert-Butyl-2,4,5-Trinitro-M-Xylene (Musk Xylene)	< 0.1
Bis (2-Ethylhexyl) Phthlalate (DEHP)	< 0.1
Hexabromocyclododecant (HBCDD) and all major Diastereoisomers identified: Alpha-Hexabromocyclododecane Beta-Hexabromocyclododecane Gamma-Hexabromocyclododecane	< 0.1
Alkanes, C10-C13, Chloro (Short Chain Chlorinated Paraffins)	< 0.1
Bis (Tributyltin) Oxide (TBTO)*	< 0.1
Lead Hydrogen Arsenate*	< 0.1
Triethyl Arsenate*	< 0.1
Benzyl Butyl Phthalate (BBP)	< 0.1

Remark:

SVHC = Substance of very high concern

* = Determination was based on elemental analysis

Appendix A **Product Photos**