

DIBOND®



DIBOND®

MADE IN GERMANY BY 3A COMPOSITES.

Pioneers in Aluminium.

Singen – the centre of innovation: The small town has been strongly linked to the success story of aluminium from the very start. The beginning of the 20th century was a pivotal point for Singen as a break through in large scale industrial production of the new material: chemist Dr. Erwin Lauber, businessman Robert Victor Neher and engineer Albert Gmür succeeded in developing a process which allowed the continuous rolling of aluminium into very thin aluminium strips. 1910 they applied for a patent and 1912 already the Dr. Lauber, Neher Co. GmbH was founded in Singen.

The Inventor of Aluminium Composite Materials (ACM).

Invented in Singen: ALUCOBOND®, the first ever ACM worldwide, consisting of a plastic core and aluminium layers was ready for serial production in 1969. Firstly developed for architectural applications, ALUCOBOND® was soon applied for advertising signs as well. Compared to other materials like solid aluminium which had been used for those applications so far, the unequalled advantages of ALUCOBOND® in terms of weight and stiffness immediately became obvious. The innovative idea behind this concept was further developed and by the end of the 1980s when Singen was witnessing a massive boom in the advertising market their first ACM was adjusted to the specific needs of this industry - as such, a new product – lighter, thinner cover layers, printable – was born : DIBOND®

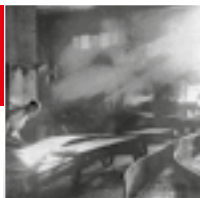
DIBOND® – the original.

As the first aluminium composite material especially optimised for the display market worldwide, DIBOND® has been produced in Singen since 1992.

Light weight, high versatility, easy fabrication: DIBOND® combines two 0.3mm aluminium cover layers with a polyethylene core. Designers, advertising agencies, shop fitters, furniture designers and finally printers discover DIBOND® for their specific needs. Pioneering to this day: we continuously develop new surfaces, colours and dimensions. A convincing class of its own.

3A COMPOSITES – global brands from one source.

3A COMPOSITES (formerly Alcan Composites) is an innovative, internationally operating business unit of Schweizer Technologies AG and commercializing aluminium composite materials for the sign and display market, core materials for structures in the transportation and industrial sectors, as well as aluminium composite materials for applications in architecture, architectural signage and cladding. 3A Composites GmbH stands for high quality products and the production of generic brands – these being FOREX®, KAPA®, GATORFOAM® and FOAM-X® in addition to DIBOND®. As the only source 3A COMPOSITES offers a comprehensive and complementing portfolio of products for the visual communication market which is available through our exclusive distributors. Through local consultants, in-house workshops and a technical service for all questions related to application and processing we keep in touch with our customers.



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DIBOND®

DIBOND® IS, WHAT YOU MAKE OF IT. IN ALL DIMENSIONS.

More than just an ACM: DIBOND® from 3A COMPOSITES combines excellent new product features resulting from extensive R & D programs. We invest in the development of innovative surface solutions and we work continuously on new fabrication techniques. That is why DIBOND® provides great creative potential for any 3D applications.

DIBOND® - unlimited potential for all your creative ideas.

Combining innovative materials.

DIBOND® combines 0.3 mm Aluminium layers on both sides with a Polyethylene core. The light weight sheet material can be transformed three dimensionally by using the routing and folding technique but it is stiff and stable at the same time - ideal for indoor as well as outdoor applications. The original was developed by the market leader 3A COMPOSITES.

We count on integrated production processes and innovative products "Made in Germany". All production steps – fabrication of the cover layers, coating, laminating, quality control - are bundled at our production site in Singen. This is how we can guarantee first class raw materials and high quality products – which is crucial for the later processing, application and usability of the product.

Moreover we aim at offering the maximum possibilities regarding combination and creativity with our material towards our customers. Therefore we offer DIBOND® in an extraordinary range of colours and surfaces: front and reverse side are either stove lacquered with white or coloured surfaces, available in matt or high gloss, brushed or anodised, or even with a mirror-like or wood décor.

The unique alloy - AlMg1.

3A COMPOSITES is the only manufacturer using an AlMg1 alloy for the DIBOND® cover layers. **Your advantages:**

- sturdy material
- especially for 3D applications by using the routing and folding technique
- excellent processing characteristics
- advanced corrosion resistance

The special Polyester coating system.

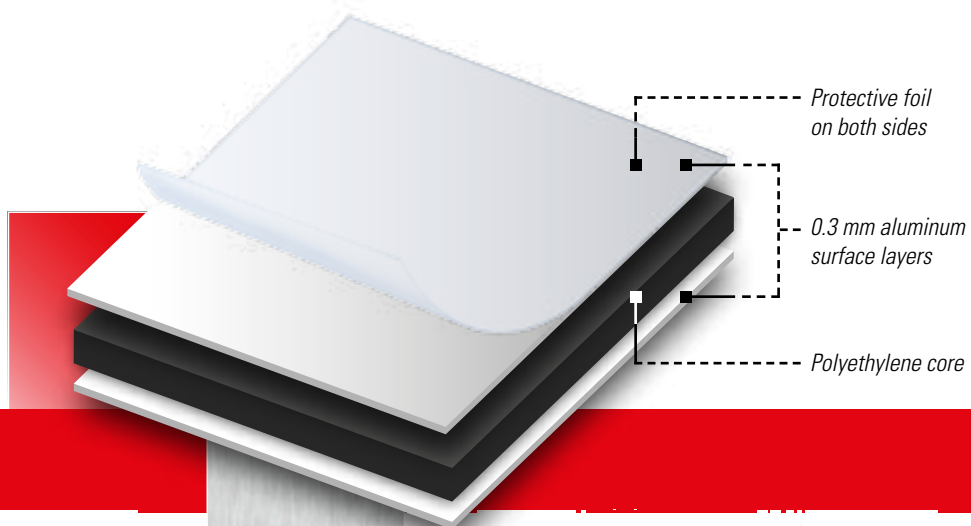
- stove lacquered according to ECCA - Standards
- constantly high quality of colour as well as colour consistency
- only in-house lacquering at the 3A COMPOSITES site in Singen
- very even, flat surfaces
- perfect printing properties
- no heavy metals in the lacquer system
- conforms to RoHS, REACH and WEEE

The black core. UV-Blocker.

The two aluminium layers enclose a black polyethylene core.

Your advantages:

- UV-protection
- material stability caused by the black core
- excellent long term application outdoors



LATEST FINDINGS FROM RESEARCH AND DEVELOPMENT.

Convincing properties. Convincing in its application.

DIBOND® provides excellent properties for processing, handling, transport and installation

- very high stiffness and dimensional stability
 - ideal for large format applications
- three dimensional processing by using the routing and folding technique - offering various creative applications
- processing and installation on the spot - pre-fabrication and flat transportation require only few steps from panel to 3D display
- long term application outdoors - very low thermal expansion
- weather resistant - applicable with temperatures between -50°C up to + 80°C

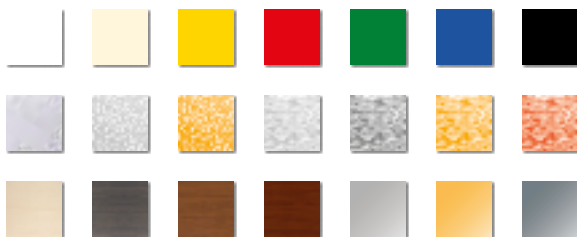
2050 mm width. Exploring new dimensions.

DIBOND® offers the widest dimension worldwide – 3A COMPOSITES manufactures the world’s largest sheet material for the display market.

- ideal for large format printing and large-sized signs
- allows wide effective spans
- excellent flatness

Standard colours and complementary colours. You name it.

DIBOND® offers endless options for individual designs through creative colour schemes. Our colour span ranges from basic to trendy, platinum white, metallic, colour nuances of the whole colour palette. Due to continuous developments we complement the range constantly and offer short term availabilities even for individual complementary colours.



Comparison of thickness and weight with same stiffness

THICKNESS	MATERIAL	WEIGHT
3 mm	DIBOND®	3,8 kg/m ²
2,4 mm	Full aluminium	6,5 kg/m ²
11,1 mm	PVC	5,6 kg/m ²
1,7 mm	Steel	13,3 kg/m ²
6,8 mm	Acrylic	8,2 kg/m ²

Thickness (mm)	2	3	4	6
Weight [kg/m ²]	2,90	3,80	4,75	6,60

Formats [B x L]	2	3	4	6
1000 x 2050 mm*	■	■	■	
1000 x 2500 mm*	■	■	■	
1250 x 2500 mm	■	■	■	
1250 x 3050 mm	■	■	■	
1250 x 4050 mm	■	■	■	
1500 x 3050 mm	■	■	■	■
1500 x 4050 mm	■	■	■	■
1500 x 5050 mm	■	■	■	
1500 x 6250 mm	■	■	■	
2050 x 3050 mm*	■	■	■	
2050 x 4050 mm*		■	■	

*These are standard formats ex works. Individual cut-outs are available through our DIBOND® distribution partners. The formats 1000 x 2050 mm, 1000 x 2500 mm, 2050 x 3050 mm and 2050 x 4050 mm are available in platinum white and metallic aluminium.



RECYCLING

3A COMPOSITES RELIES ON SUSTAINABILITY AND ENVIRONMENTAL PROTECTION



Sustainability and environmental protection represent an increasingly important topic in advertising and visual communication and turn out to be essential criteria for buying decisions.

As the market leader in production and of Aluminium Composite Materials, we are aware of our responsibility to set standards for sustainable developments. Constantly we control and advance our raw materials as well as our production process and the products themselves, to act in a sustainable and ecology minded way.

Environmental protection as an integrative component of sustainability management at 3A COMPOSITES

Sustainable involvement and environmental protection have always been amongst the essential corporate objectives at 3A COMPOSITES. The minimisation of risks for man and environment as well as the reduction of environmental pollution through careful and efficient utilisation of resources is part of the corporate philosophy. 3A COMPOSITES as a globally operating company is aware of its responsibility and has been an active campaigner in matters of sustainability ever since. Sustainability management at 3A COMPOSITES deals in depth with all three levels of sustainability: the ecological, social and economic level.

Environmental management systems

Our DIBOND® production site in Singen is certified according to ISO 14001, which establishes globally recognised requirements for environmental management. Therefore the ISO certification is not only an important criterion for ourselves, but also in our selection process of suppliers. Based on uniform processes and structures we succeeded in anchoring an environmentally responsible behaviour throughout the company.

Furthermore, a strong linkage of management systems for quality (ISO 9001), environmental protection (ISO 14001) and occupational safety (OHAS 18001) is a key point in our corporate philosophy in order to integrate environmental protection in all daily tasks and corporate policy decisions.

Substances

Discussions around hazardous substances have become more intense during the past few years. A comprehensive restructuring of European chemical policy is currently being undertaken with the gradual implementation of the REACH regulation. The ultimate objective of this new regulation is the protection of human health and the environment through a uniform evaluation process of all substances considering their endangering potential for man and environment.

DIBOND® is a high quality product which goes through extensive quality controls during its production process. As the abstention from hazardous processes and substances is one of our highest priorities all aluminium cover layers are manufactured at our site in Singen and also the lacquering of these layers takes place in Singen. All lacquer formulas applied for DIBOND®, also the special colours, come from a local source and do not contain any heavy metals. This has been tested by an independent institute and an according certificate is available for our DIBOND® range.

Extensive tests with competitive materials have revealed that quite a few products from competition contain heavy metals such as lead and hexavalent chromium with cadmium.

Waste reduction and recycling

Efficient processes during the production phase, i.e. resource efficiency and the consistent avoidance of waste, represent another focus area for 3A COMPOSITES. The recycling of raw materials back into the production process as well as the material utilisation of production waste has already been a common practice at our production sites for years.

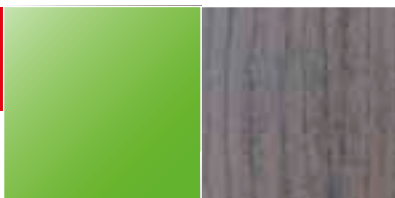
As DIBOND® can be technically separated to its original components being aluminium (layers) and PE (core), while the recycling of the material is quite an easy process. Especially the aluminium provides an unequalled advantage: the raw material can be endlessly recycled without any quality losses.

Furthermore the treatment and recycling of aluminium need approx. 90% less energy than the winning and production of the primary material. At a thickness of 3 mm, the percentage of the Aluminium in DIBOND® represents 40% and can therefore make a valuable contribution to promote recycling and to a good eco-balance.

In addition to the comprehensive recycling on the production level, 3A COMPOSITES is the only manufacturer offering a recycling concept for the end market. The concept is based on a close cooperation with our distribution partners who take back DIBOND® post-consumer wastes. In order to maintain the high quality of our products 3A COMPOSITES would only take back original DIBOND® sheets that are correctly sorted - which is guaranteed through an intake control.

Growing with responsibility!

Ethically correct behaviour towards man and environment is the basis for all corporate actions. We are aware of this responsibility!



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INDOOR SIGNAGE

EYE CATCHING. INDOOR SIGNAGE WITH DIBOND®.

Advertising agencies decide for DIBOND whenever high-quality indoor signage is needed:

- for advertising signage at airports, retail stores or in shopping malls – use also fire retardant DIBOND FR
- information boards, direction signs, pylons
- for exhibitions or museums and other high-quality fields of application with an artistic demand

Handling: easy and stable.

Compared with other materials like full metal sheets, DIBOND® is extremely lightweight which not only saves manpower when handling but also transport costs. DIBOND® is rigid and dimensionally stable – also when used for large format applications. Its trouble-free on-site processing makes DIBOND® the first choice for any creative 3D solution.

Surface: flat and even.

There are no limits for advertising when working with DIBOND®: photo mounting, lettering or over lacquering. People from the screen printing and digital printing industry value the flatness of the DIBOND® surface when it comes to exacting printing and mounting applications.

Format: inventive and multifunctional.

DIBOND® is available in various standard formats, even up to 2050 mm width. Moreover DIBOND® can be easily adjusted to the requested format. Sawing, stamping, cutting and bending, even with the famous routing and folding technique: everything is possible. Additionally fastening and connecting with rivets, screws or glue for metal applications is easy to realize.

OUTDOOR SIGNAGE

WEATHERPROOF! OUTDOOR SIGNAGE WITH DIBOND®.

Wherever you are – DIBOND® makes a point:

- traffic and orientation signs, guidance systems within public buildings e.g. on airports, railway stations or stadiums
- pylons and totems (e.g. company or CI signage)
- billboards and hoardings
- light boxes and displays
- eye-catching outdoor advertising campaigns

It is a survivor.

As far as weather-resistance is concerned, all criteria speak for DIBOND®. It defies all environmental impacts in the long run – guarantees upon request.

UV-Blocker:

- the black core material is ideal for outdoor applications
- constantly high quality of colours in sunlight: consistent colour aging

Constancy of the surface:

- consistent layer thickness of the paint

Resistant to temperature changes:

- from -50°C up to +80°C

In comparison to plastics (acrylic, glass, PVC):

- low thermal expansion

In comparison to full aluminium sheets:

- same coefficient of thermal expansion
- thanks to its flatness easy application of protective laminates

Spectacular.

Low weight, high dimensional stability: offering a big advantage when used outdoors. With DIBOND® you will have many creative options for advertising spaces, large format printing or photo mounting.

Oversized.

Outdoor Designers go for DIBOND® as there is no comparative material offering such low weight at the same dimensional stability. As such, even 2050mm wide panels are easy to handle. As the surface is absolutely even, DIBOND® promises ideal adhesion of foils and inks and excellent results for photo mounting.



SHOPFRONTS

CREATING IMAGE WITH DIBOND®.

An impressive presentation...

There are many possibilities to show corporate identity: corporate signage, according shopfronts as well as all outdoor signs of the corporate offices and buildings. DIBOND® covers the whole range of advertising possibilities.

Creative solutions with various DIBOND® surfaces: lacquering, laminating, mounting, printing... there are endless possibilities and combinations to create a diversified look with a high recognition value. Unique processing techniques like routing and folding, punching and cutting forms allow design oriented structuring of shop fronts, in order to present your individual CI. A wide range of profiles and fixing accessories complete our product portfolio.

...with real shop front qualities...

- excellent weathering characteristics, guarantees upon request
- UV stability and colour consistency in sunlight
- resistant to temperatures up to 80°C
- constantly high quality and flatness of the surface
- protective film on both sides
- available in a wide range of colours and structured surfaces

...and fascinating perspectives.

DIBOND® attracts all attention. Individual surface finishes combined with neon lights or LED provide inventive and fancy day-and-night-effects.

PERSPECTIVES

SHOPFRONTS



ethelaustin



EXHIBITION DESIGN

MODULAR. MULTIFUNCTIONAL. MULTI-USE.

Easy project management.

DIBOND® is the perfect medium in order to create individual designs with easy processing techniques. Due to its width up to 2050 mm DIBOND® can be applied for large sized areas in exhibition concepts or high quality signage – but just as well can small sized panels be used for wall construction, exhibition furniture or 3D displays. We would be happy to help you implementing your ideas or support you with advice concerning installation and processing of DIBOND®.

Easy logistics.

DIBOND® stands for many different formats, sheet sizes and thicknesses for individual exhibition design or standard exhibition systems – for two- or three-dimensional designs. DIBOND® allows pre-fabrication, flat transportation and on-site installation.

Easy installation.

Problem – free sizing, processing and installation on site. Cutting to size, routing and folding as well as fixing with rivets or screws. Even last-minute corrections are easy. DIBOND® takes first place when it comes to stiffness and dimensional stability.

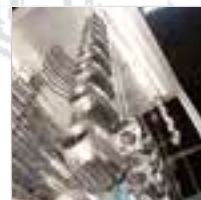
Efficient and reusable.

Except for their unequalled advantages regarding, surface quality, evenness and ideal processing characteristics, DIBOND® composite sheets are also reusable. Changing of laminates after an exhibition is not a problem (correct application provided) and make DIBOND® ready for the next presentation. Even recycling is easy with DIBOND® – 3A COMPOSITES offers a unique take-back concept of all used original DIBOND® sheets in cooperation with distribution partners. Like this DIBOND® can be recycled in 3A COMPOSITES own recycling facilities and prepared for re-use.

Security concepts for your exhibition design: DIBOND®FR.

Even highest demands regarding fire resistance for construction materials, signage and design can be fulfilled with DIBOND® – use DIBOND®FR which conforms to "Class B s1, d0" according to EN 13501-1 (equivalent to B1 in Germany).

MULTI-FUNCTIONAL



SHOP FITTING - SHOP DESIGN

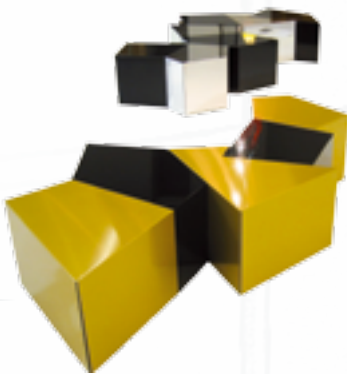
DIBOND® CREATES DESIGN ORIENTED AMBIANCE.

Get inspired! DIBOND® provides fascinating surface effects and diverse forms in all dimensions. You will be surprised of the unlimited amount of ideas and designs which can be realized with DIBOND®.

Rooms for presentation, consulting and sales: DIBOND® adds ambiance, atmosphere and design. Be it for furniture – tables, chairs, shelves – cladding for walls or ceiling, counters, bars or even kitchens... DIBOND®'s versatility in processing allows creative solutions to shop designers.

Exclusive design, harmonious ambiance.

High quality DIBOND® surfaces create the right atmosphere for successful communication with customers - DIBOND® reflects the quality and of the products and brands to be sold. Aesthetics with DIBOND®mirror, DIBOND®decor or DIBONDbutlerfinish®: trendy, cool, classic – whatever you wish - high gloss, luxurious, colourful or printed - just for decoration or for eye-catching spots.



FURNITURE DESIGN

DIBOND® CREATES DESIGN ORIENTED AMBIANCE.

Easy processing, individual design.

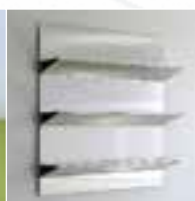
Especially for furniture design DIBOND® offers many opportunities with diverse processing possibilities: routing and folding technique, structuring, bending. As such, DIBOND® helps you to create individual and fancy 3D-shapes.

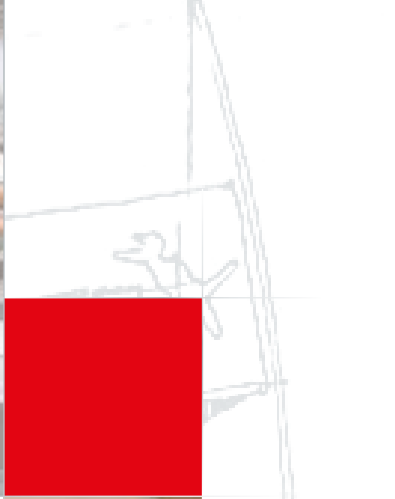
Create images, raise emotions.

Structuring of rooms might be one of the most important aspects of shop fitting. Its specific design shows different areas of a shop, transfers its functional spaces and allows a clear differentiation of each part of the shop. DIBOND® is the ideal partner in an interplay of colours, forms and surfaces in order to create the right ambiance and look.

Security & Style.

Attractive and safe: all in! Especially when it comes to indoor applications the material used faces high demands: DIBOND® provides fire retardant surfaces, mirror-like surfaces which are shatter-proof for counters or bars.





DISPLAY – POS/POP

THE RIGHT MATERIAL FOR YOUR BRAND MESSAGE

Classy product presentation, decorative and eye catching spots: high quality products need to be reflected by their marketing campaigns and therefore by the right medium of their presentation. For this purpose DIBOND® is the right material for 3D products displays and advertising materials. Easy creations and creative characteristics – simply the right material to present a product.

Using different surfaces, colours and forms means creating individual sales displays, pylons and totems, product carriers, even shelves, boxes... The point of contact is where target groups appreciate creative solutions and communicative designs.

Form follows function. And your phantasie.

Put it up, lay it down, bend it around the corner: DIBOND® provides the right material for all shapes and constructions on ceilings, walls and even pillar-constructions at the point of sale.

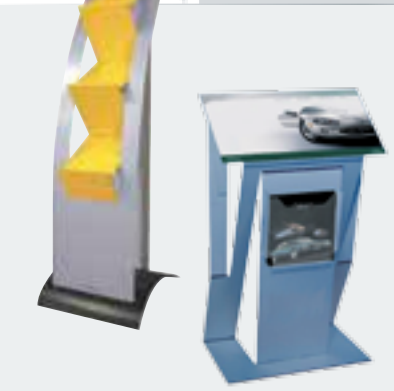
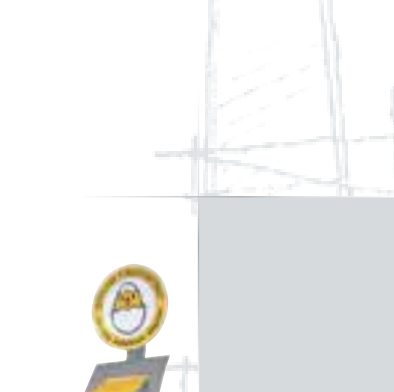
Processing is easier than you think

- no comparative material shows such a light weight at the same dimensional stability – be it full aluminum, PVC, steel or acrylic
- the ease of shaping – even for large sized applications – is unique
- creative processing opportunities are easier than you might imagine: bending, punching, cutting to shape, routing, folding
- easy fixing: riveting, screwing, hot air welding, glueing

Individual 3D designs. For high tech demand.

Our great choice of surfaces for indoor and outdoor applications meets even highest demands concerning material consistency and long term usage.

- DIBOND®eloxal is resistant to finger prints – and eye-catching at the same time
- Shatter proof DIBOND®mirror and fire retardant DIBOND®FR provide security at the point of sale.



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GENERAL INFORMATION

PLEASE READ CAREFULLY BEFORE WORKING WITH DIBOND

THE FOLLOWING IS GENERAL INFORMATION FOR THE PROCESSING OF DIBOND® – FOR MORE DETAILED INFORMATION AND TECHNICAL CONSULTING WE KINDLY ASK YOU TO REQUEST OUR PROCESSING DATA SHEETS WHICH ARE AVAILABLE FOR EACH PROCESSING METHOD IN DETAIL.

Installation

To avoid possible reflection differences (for metallic colours or DIBONDbutlerfinish®) we recommended installing the panels in the same direction as marked on the protective film.

Batch identity

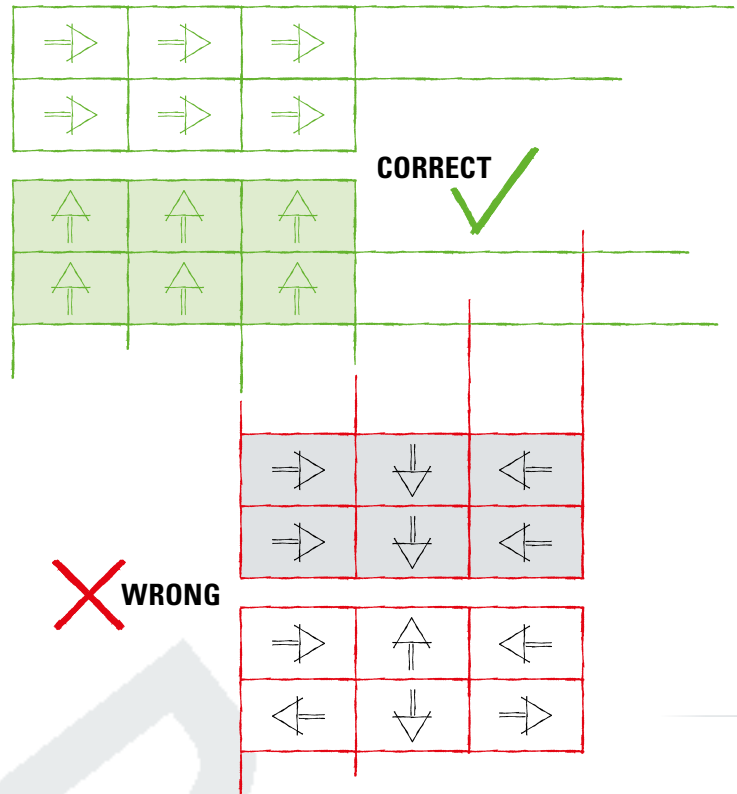
We strongly recommend using material of the same production batch to reach an ideal result with a uniform colour shade.

Protective film

The protective film on both sides protects the lacquered DIBOND® surfaces against damages that can occur during transportation, storage, processing or installation. We recommend removing the protective film from the sheets as soon as possible after installation in order to avoid residues of glue sticking to the surface due to radiation and outdoor exposure. The protective films and the panel surfaces may not be marked using ink (marker), adhesive tapes or stickers, as the lacquered surfaces could be damaged by solvents or plasticizers.

Handling

The pallets need to be handled carefully during transport and unloading. Especially for the handling of large formats the individual panels should only be lifted off the pallet by two people holding all four corners. The panels may not be drawn over each other. We recommend carrying the panels vertically and wearing gloves to avoid staining.



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Storage

DIBOND® pallets of the same size can be stacked however only with a maximum of 6 pallets stacked on top of each other.

A storage exceeding 6 months should be avoided. It is important to protect DIBOND® pallets against rain, wetness, spray water and condensation (e.g. when transporting cold panels to warmer rooms) at any time while storing.

Prior to any processing steps the panels should go through an intermediate storage for 24 hours at temperatures between 18°C and 20°C. For short term storage between two processing steps we recommend underlying the sheets with polystyrene or foam wedges.

Cleaning and maintenance

Regular cleaning and the removal of dirt and aggressive deposits will not only maintain the aesthetic look of stove-lacquered surfaces but also their value and quality. DIBOND® surfaces should be cleaned either manually or with a suitable cleaning device from top to bottom. Abrasive pads may not be used on lacquered surfaces. Any powerful alkaline cleaning agents such as potassium hydroxide, sodium carbonate or caustic soda, or any powerful acidic products or heavily abrasive scouring agents would harm the lacquered surface and may therefore not be used. After the cleaning the surfaces should be washed with cold water in order to remove cleaning residues.

Cleaning of mirror like surfaces:

Even though DIBOND® is handled with care, dirt and impurities such as finger prints can occur. Vilene or other fleece material for mirror surfaces with no liquid additives are suitable for cleaning. In case the dry cleaning should not be sufficient, water with a low surface tension can be used for pre-cleaning. The drying should again be done with a fleece cloth.

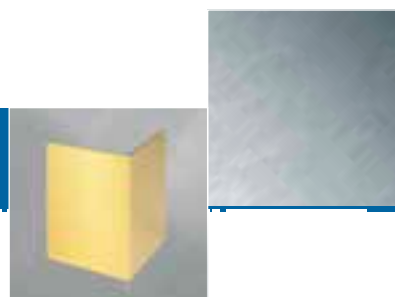
Any liquid cleaning agent should be pH-neutral and may not be abrasive. Cleaning agents for glass can be used if they correspond to the a.m. criteria.

We advise you to test the cleaning agent on an inconspicuous part of the DIBOND® panel to check the usability.

Do not clean hot surfaces ($> 40^{\circ}\text{C}$) as the quick drying process may cause blemishes.

Expansion of DIBOND® sheets

As DIBOND® is used at temperatures between -50°C and $+80^{\circ}\text{C}$ it is subject to thermal expansion or shrinking which needs to be considered when choosing the fixing system, fasteners and sealing. The linear thermal expansion of DIBOND® is determined by the aluminium cover sheets and can be exactly calculated (see page 24).



MACHINING FABRICATION TECHNIQUES

INDIVIDUAL DESIGN.

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Cutting and Sawing

DIBOND® can basically be cut or sawed with a vertical panel saw, circular or jig saw. The circular saw is applied for DIBOND® in the same as for full aluminium sheets. The vertical has proven ideal for serial cut, high cutting volumes and whenever an extremely high precision of the cuts is required. For DIBOND® saw blades for cutting should be used. The cutting needs to be done on the reverse side of the panels. For cut-outs of the same format you can make cuts up to 5 panels.

There are three basic measures for a perfect cutting result:

- Keep your workplace clean in order to avoid scratches on the DIBOND® surface
- Use an appropriate vacuum cleaning system
- Work on the reverse side of the panel



Contour cutting, contour milling

DIBOND® can be cut to shape using jig saws, scroll saws, contour mills, CNC machining centres and water jet cutting machines.

- When cutting with jig saws, please use saw blades for wood and plastic materials
- Cut abrasively when using a water jet cutting machine. Pre-drilling of the panels is necessary when starting the contour cut in the middle of a panel as it is not possible to drill through with the water jet.
- For contour cutting on CNC machining centres use a one-edged cutter. Whenever absolute precision is requested, CNC-machines are the best solution in order to achieve the most accurate and detailed cuts and forms.



Drilling

DIBOND® can be drilled with twist drills which are used for aluminium and plastics on common machines for metals. The best results are achieved with metal drills for stainless steel with a centre point and a point angle between 100° – 140°.



Punching

DIBOND® panels of any thickness can be punched using standard metal punching machines.

Sharp tools and dies with minimal cutting clearance (0.1 mm) are important to achieve clear cuts. Punching will cause a slight deflection of the cut edge on the impact side. Holes of a minimum diameter of 4 mm can be punched. The minimum width of web between hole edges is also 4 mm. High volumes of the same punching format can be punched on serial punching machines



Shearing

DIBOND® can be easily sheared with a guillotine for thin sheets. Slight compressions of the aluminium cover sheet on the edges may occur at the impact side. The clamp on the shear should be fitted with a shock-absorbing rubber pad to prevent damage to the cover sheet. Additionally corner-cutting tools can be used for punching DIBOND® sheets.

Fettling

We recommend a fettling tool with rotary blades or an abrasive pad for cleaning or deburring the edges of DIBOND®.



SHAPING

INDIVIDUAL DESIGN

THE FOLLOWING IS GENERAL INFORMATION FOR THE PROCESSING OF DIBOND® – FOR MORE DETAILED INFORMATION AND TECHNICAL CONSULTING WE KINDLY ASK YOU TO REQUEST OUR PROCESSING DATA SHEETS WHICH ARE AVAILABLE FOR EACH PROCESSING METHOD IN DETAIL.



Routing and Folding

For individual designs DIBOND® can be shaped with the so called routing and folding technique which allows a variety of shapes and design to be manufactured. A V-shaped groove is routed on the reverse side of the DIBOND® using a disk or end milling cutter. The grooves can also be produced using a vertical panel saw with a routing device for DIBOND®, on a CNC machining centre, with a panel routing machine or a hand routing machine. A thin layer of the core material needs to be left at the base of the groove, i.e. on the inside of the outer cover sheet. The outer cover sheet can then be bent manually, resulting in an exact and clean folding line which follows the routed groove. The outer radius of the folded edge depends on the shape of the groove and its depth. The whole folding should be done in one action, exceeding the desired angle by 10 to 20 degrees.

Important - folding succour:

To bend a narrow and long DIBOND® folding edge we recommend using a folding succour fabricated of a DIBOND® panel strip and a joint profile (U/H-profile).

The routing and folding technique offers convincing advantages:

- Minimum investment for the production of individual DIBOND® shapes
- Milling machines are inexpensive tools which are equally applicable for workshops or construction sites
- Serial parts can be produced economically on vertical panel saws
- Easy technique allowing many design possibilities
- Folding can be done manually on site, no pre-fabrication necessary, flat transportation - this means low costs for transport and storage
- Inexpensive production of shaped parts like interior claddings, shop fronts, furniture, POS displays, corner pieces,
- Shapes are not restricted by machine dimensions

Please note: The routing and folding technique can be used for all DIBOND® standard surfaces.



Bending

DIBOND® can be formed three dimensionally by means of conventional metal and plastic fabrication methods. The minimum bending radius is fifteen times the plate thickness.



Bending with a brake press:

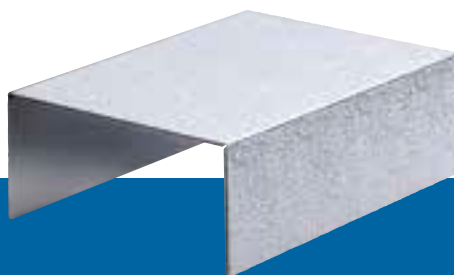
DIBOND® can be formed with a brake press just like full metal sheets. For this technique, the so called airbending process is applied. The DIBOND® panel rests on the edges of the die (rails, channels) and is bent by the punch (tube or shaft). The bending angle is determined by the width of the die and the stroke of the punch.

Bending with a folding machine:

When working with folding machines, DIBOND® is clamped between two cheeks. The projecting edge is bent around the upper clamping cheek and former using the movable swivel bar. The bending radius is determined by interchangeable formers attached to the upper clamping cheek.

Bending with a roll bending machine

DIBOND® can be bent with roll bending machines as they are used for full metals – mainly with three- or four-roll machines



JOINTING AND FIXING TECHNIQUES

SAFE SOLUTIONS FOR ALL APPLICATIONS

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DIBOND® can be joined by means of standard processes used in metal and plastics manufacturing.

If DIBOND® needs to be joined to structural metal parts other than aluminium, or if fasteners (e.g. bolts, screws) are used, the following material guidelines need to be considered:

- Fasteners and structural parts made of aluminium, plastic or stainless steel are applicable.
- When using other materials insulating intermediate layers or protective coatings are required to prevent corrosion.
- For the outdoor use of DIBOND®, its thermal expansion needs to be considered in order to avoid deformation.
- The minimum hole clearance for the fixing material in the panel depends on and must be chosen according the expected expansion of the panel in order to avoid restraints or deformation

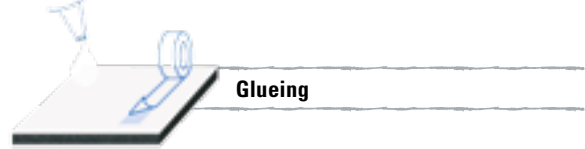


DIBOND® panels can be fastened together or joined to other materials with standard rivets for aluminium constructions. For outdoor use and areas of high humidity we recommend aluminium blind rivets with stainless steel mandrils in order to prevent corrosive edges. Countersunk rivets are suitable for indoor use only.

Please note: important for exterior riveting

As various factors may have an influence on the exact tolerance of the 0.3 mm thick rivets (e.g. rivet head tolerance), we recommend making a test on a panel.

The protective film in the riveting area needs to be removed prior to riveting.



Glueing is a common jointing technique for DIBOND® which is used for various applications. We recommend the following glueing methods:

Metal adhesives / Universal adhesives

For indoor applications such as trade fair/exhibition stand structure, furniture or shop design universal adhesives or metal adhesives are most suitable.

Glueing tapes / velcro tapes

For applications with low requirements regarding tensile strength or shearing strength, double-sided tapes (such as the 3M-VHB high capacity jointing systems) can be used. For detachable joints we recommend Velcro® tapes such as SCOTCHMATE® or tapes known under the brand name Dual Lock®.

Adhesive sealing compounds

For elastic joints we recommend the one-component adhesive sealing compound SIKA BOND-T2 (POLYURETHANE BASIS). This adhesive can be used outdoors for jointing parts of minor static importance.

Please note:

Please read the manufacturers instructions for the application and use of adhesives/ tapes carefully. Adhesives and sealing compounds do not adhere to the DIBOND® plastic core (cutting edges). The glueing of DIBOND® to other materials may result in deformation of one or both of the laminates due to the different expansion parameters of materials (bimetal effect).

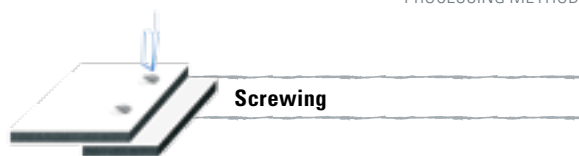
The expansion of the panels with temperature changes has to be taken into consideration as well. In order to absorb the expansion we recommend to choose glues that provide enough elasticity.



JOINTING AND FIXING TECHNIQUES

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SAFE SOLUTIONS FOR ALL APPLICATIONS



Screwing

Fastening without forcing is possible using fascia screws made of stainless steel with sealing washers that have been approved for construction. It goes without saying that the screws must be suitable for the corresponding substructure.

Screws with different head-shapes for any metals or wood are suitable for indoor use. They do not normally allow for any panel expansion. Countersunk screws can be used with the standard countersinking method or by depressing the aluminium surface into the panel. When depressing the aluminium surface, the diameter of the hole in the panel needs to be larger than the screw diameter. Countersunk screws are suitable for indoor use only.

Please note for indoor and outdoor application:

It is important to remove the protective film in the screwing area prior to screwing.



Clamp connections

Especially for exhibition design, signage and display applications, clamp connections are a favoured method to join materials.

Clamp connections out of aluminium or plastics are particularly suitable for DIBOND®.

They generally consist of two parts with the clamping effect achieved by bolting. Various designs of clamping elements and aluminium profiles can be used for shock-resistant and stiff indoor display and store fitting purposes. The inevitable tolerances show different retention forces.

A uniform and solid fit of the sections is obtained by pressing both sides of the profiles together. Butt joint, corner and edge profiles are available for panels of 3 mm, 4 mm and 6 mm thickness.

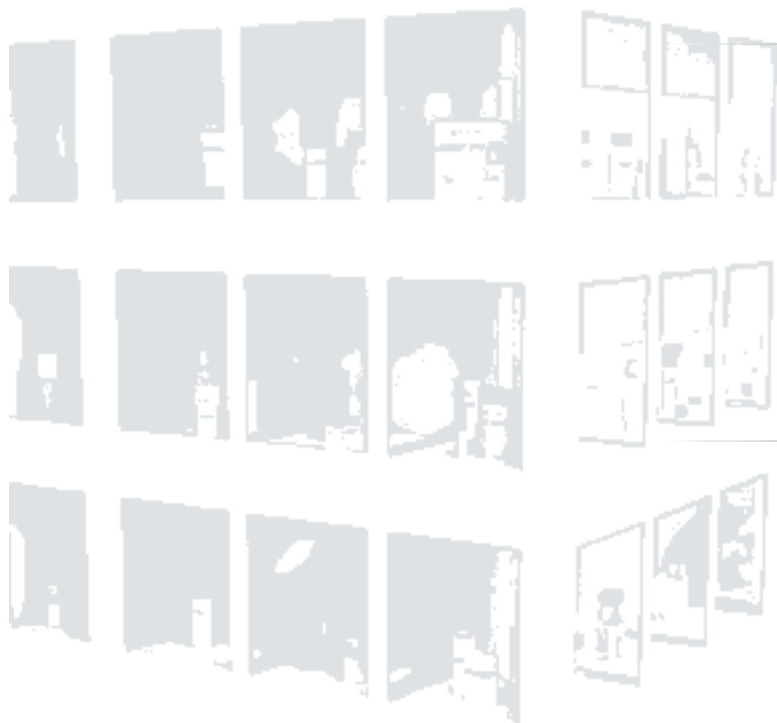


Hot air welding

Hot-air welding is a standard technique for joining thermoplastics and has proven useful for welding of DIBOND® as well. The plastic core and the plastic welding rod are heated and welded with electrical hot-air welding sets. The plastic core of DIBOND® can be hot air welded by using a polyethylene welding rod. We do not recommend this method for constructive applications.

The following conditions are essential for good welding results:

- Well prepared welding joint
- Good quality welding rod
- Clean hot air
- Correct temperature
- Correct contact pressure
- Welding speed



SURFACE TREATMENT

COLOURING EFFECTS

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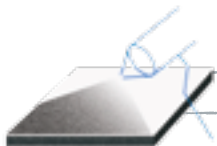


Lamination and photo mounting with adhesive foils

DIBOND® can be laminated (manually or by machine) with cast or calendared self-adhesive foils. Even when changing the foils for multi-use of the DIBOND® sheets, the varnish does not come off. Depending on the size of the foils, different methods of applying the film can be used. Photo mounting is either done with adhesive films or wet with dispersion adhesive. For manual lamination it is important to work with a scraper. This technique is mainly used for applications such as advertising signs, campaigns and event marketing, while photo designers appreciate the evenness and stiffness of the DIBOND® panels combined with their low weight.

It is important that the DIBOND® surface is clean and free of dust and grease before foils or photos are laminated onto the surface.

Even after the lamination or photo mounting diverse fabrication techniques with DIBOND® are still possible – e.g. the routing and folding technique or the forming of cassettes which adds visual depth to photo images.



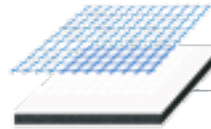
Overlacquering – varnishing

Most customer requirements for special DIBOND® colours are already met by our wide range of standard and complementary colours.

However for small volumes in very special colours which are not included in the DIBOND® colour range it might be worth to overlacquer DIBOND® sheets. The fact that the aluminium pre-treatment and the priming are already provided by the continuous process which DIBOND® has gone through while being produced is definitely an advantage

The working process of new DIBOND® panels is as follows:

1. Pre-cleaning of the panels with Ethyl- or Isopropyl alcohol
2. Grinding the surfaces with wet abrasive paper (grain size 360)
3. Removing grinding dust with a lint-free cloth moistened with spirit
4. For the top coat, please follow the instructions of the top coat suppliers



Screen Printing

Stove-lacquered DIBOND® surfaces are well suited for screen printing. It is important to remove the protective film and to clean the surface using ethyl alcohol or isopropyl alcohol and a fluff-free cloth prior to printing. The alcohol must not be applied directly to the panel. Between cleaning and printing the alcohol needs approx. 10 – 15 minutes to evaporate. A lamination of the prints can be useful in order to achieve special surface effects or to improve mechanical or chemical properties.

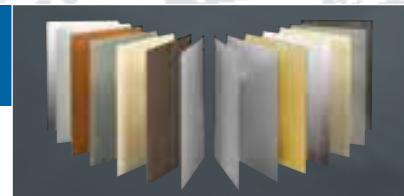


Direct-to-substrate digital printing

As the polyester lacquered DIBOND® surface is very flat and homogeneously smooth it provides outstanding ink adhesion and is printable on all standard flat bed printers. All standard DIBOND® colours as well as most of the decorative DIBOND® surfaces, e.g. DIBOND®butlerfinish®, DIBOND®mirror or DIBOND®decor are ideal printing substrates and have proven excellent printing result during the past decade.

Since DIBOND® is resistant to temperatures from +80°C to -50°C, resistant to water and UV, yellowing or distortion through UV lamps and sunlight does not occur. Hence, digitally printed signs can be used long term and keep their colour quality even outside.

Regarding the pre-treatment we recommend the same process as mentioned for screen printing. To avoid fingerprints on the surface gloves are the easiest solution. Various processing techniques such as routing, folding or bending are possible with DIBOND®- even after printing with solvent based inks.



SURFACE TREATMENT

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COLOURING EFFECTS

New ideas with new dimensions.

The creative potential of DIBOND® becomes obvious when processing the material. Small sizes, large formats and even 2050 mm widths - DIBOND® offers many possibilities and even after printing with adapted inks each format can be cut to size, shaped, formed, bent or folded.

Especially for flat applications: DIBOND®digital.

High quality imaging and very efficient at the same time: DIBOND®digital comes with an optimised lacquer system for direct-to-substrate digital printing showing excellent ink adhesion which allows advanced printing speed. The higher performance means higher output and lower costs !

Applicable for flat application such as:

- Indoor and Outdoor signage
- Hoardings
- Photo mounting and laminating
- Screen printing

Advice for a higher quality of digital printing:

- Hints for even better printing results:
- We recommend you to service your print machines and test UV lamps regularly
- Condition the sheets to room temperature prior to use – especially when they are stored outside at low temperatures.
- Avoid fluctuating humidity or environments which are too dry (this can lead to danger from static build-up).
- Set a print profile that is optimised to the print surface.
- Only use inks recommended for rigid substrates by the machine manufacturer. Using non-recommended inks can result in poor ink bonding.
- Do not touch sheet surfaces with bare hands and do not allow any liquid cleaning materials to dry on the sheet surface.
- Sweep the sheet surface with ionised air prior to printing and consistently apply any available measures to reduce static build-up.
- If the sheet carries a protective film, this should be removed slowly and carefully.
- When printing onto DIBOND®digital a high UV intensity can be employed for rapid ink curing. The material can be processed at temperatures of up to 80 °C.
- Ink bonding can be tested reliably only after 24 to 48 hours due to post hardening (cross hatch test DIN EN ISO 2409).

Overview of direct digital print advantages

Temperature resistant up to 80 °C

No distortion caused by UV lamps

Weather resistant for exterior use

Water retardant and UV resistant

Thickness tolerance +/- 0.2 mm

Allows limited clearance of print heads

Cuts easily

Clean edges, no deburring necessary

Low weight combined with high rigidity

Allows wide effective spans

Smooth surface optimised for digital printing

Excellent print quality – even with very fine detail

Extremely flat, strong and rigid

No distortion at fixing points

Lacquer system optimised for direct to substrate digital printing

Excellent ink adhesion



TECHNICAL DATA

FOR STANDARD DIBOND® IN MATT OR HIGH GLOSS

Panel thickness		2 mm	3 mm	4 mm	6 mm
Thickness of Aluminium Layers		0.30 mm			
Weight	[kg/m ²]	2.90	3.80	4.75	6.60
Technical Properties					
Section Modulus W	[cm ³ /m]	0.51	0.81	1.11	1.71
Rigidity (Poisson's ratio $\mu = 0.3$) E · I	[kNcm ² /m]	345	865	1620	3840
Alloy of Aluminium Layers		EN AW-5005 (AlMg1), H44, nach EN 485-2			
Modulus of Elasticity	[N/mm ²]	70'000			
Tensile Strength of Aluminium	[N/mm ²]	R _m 145 - 185			
Proof Stress (0.2%)	[N/mm ²]	R _{p0.2} 110 - 175			
Elongation	[%]	A ₅₀ ≥ 3			
Linear Thermal Expansion		2.4 mm / m at 100°C temperature difference			
Core					
Polyethylene, Typ LDPE	[g/cm ³]	0.92			
Surface					
Lacquering		Coil Coating mod. Polyester-System			
Gloss (initial value)		70 - 100 %			
Matt (initial value)		20 - 40 %			
Pencil Hardness		HB - F			
Acoustical Properties					
Sound Absorption Factor α_s		0.05			
Sound Transmission Loss R _w	[dB]	23	24	25	56
Loss Factor d		0.0048	0.0057	0.0072	0.0102
Thermal Properties					
Thermal Resistance R	[m ² K/W]	0.0047	0.0080	0.0113	0.0180
Heat Transition Coefficient U	[W/m ² K]	5.72	5.61	5.50	5.30
Temperature range	[°C]	-50°C bis +80°C			
Water absorption DIN 43495	[%]	0.01			
Static charge		No antistatic treatment required			
Fire resistant		Class B2 according to DIN 4102-1			



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THANK YOU!

PUBLICATION OF IMAGES

THANK YOU!

We thank the following companies for the application pictures and their permission to publicise them in this brochure.

| Page 8 |

Bischoff Werbetechnik
Belgium | www.bischoff.be |

BMW Veteranen-Club
Exhibition September 2007
Germany | www.bmwveteranenclub.de |

Cité de l'architecture et du patrimoine
Exhibition 2008
France | www.citechailot.fr |

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Otto Wolff Benelux nv/sa
B&O Store
Singapore | www.thyssenkrupp-ottowolff.be |

Docks Généraux
France | www.docks-generaux.com |

Tourism Academy@Sentosa
Singapore | www.tourismacademy.edu.sg |

Standard8
Great Britain | www.standardeight.com |

| Page 10 |

Monsena S.R.L.
Romania | www.monsena.ro |

WeMaTec
Russia | www.wmt.ru |

| Page 10 |

Maizey
South Africa | www.maizey.co.za |

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Messerli Messebau GmbH
Switzerland | www.messerli3d.com |

Plan-2 GmbH
Germany | www.plan-2.de |

Wiesmann – Manufactory of Individualists
Germany | www.wiesmann.com |

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Simplex Ltd
Great Britain | www.simplexLtd.com |

LDV Design
Table Particule by Antoine Laymond
France | www.ldv-design.com |

Interlux GmbH
Austria | www.interlux.at |

Sogimi S.P.A.
Italy | www.sogimi.com |

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form-al, Interiors & Objects
Dipl. Designer Adrian Lippmann
Germany | www.form-al.de |

Andreas Hegert
Product & Interior Designer
Sweden | www.andreashegert.se |

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George Hlavacs
Industrie Designer
Netherlands | www.georgehlavacs.com |

YC²

Germany | www.ycquadrat.de |

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Glaeser Baden AG
Switzerland | www.glaeser.ch |

Oras Ltd

Finland | www.oras.com |

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Industrie Designer
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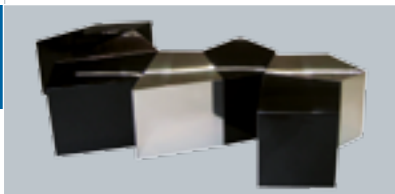
YC²

Germany | www.ycquadrat.de |



We are pleased to provide you with
all information of DIBOND® for free:

- DIBOND® standard colour chart
- DIBOND® complementary colour chart
- DIBOND® design brochure
- DIBOND® index of Suppliers of Machines, Tools,
Accessories, Sections/Section Systems
- Original samples of all DIBOND® surfaces





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