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HISTORY OF VALCHROMAT

Valchromat® was created by the research department of Valbopan as a result of a thorough and consistent research based on the need to improve and develop new and existing wood related products. It was created because of a gap in the market place, which called for a product combining colour and other specific features lacking in existing products. Valchromat® was first introduced in Paris during the 1998 Appropal Fair, winning Valbopan's technical staff both the technological innovation prize and the display prize. Since then this product has undergone different industrial tests in order to achieve its stage of maturity. Tests in furniture applications were carried out during this period in co-operation with technicians, architects and designers to appraise its benefits for a variety of uses. Finally during the third quarter of 1999 Valchromat® came into the market through distribution channels in France, Switzerland and Belgium.

EVOLUTION OF MDF (MEDIUM DENSITY FIBRE BOARD)

Over the last 30 years MDF has never really been completely accepted by specialists as an adequate product for different finishes and decorative purposes. Valchromat® has broken this taboo by introducing a new aesthetic concept of its own. Therefore not only do its chemical and physical – mechanical characteristics comply with MDF specifications, but also its standards that guarantee limitless decorative applications. Valchromat® is at least 30% stronger and more stable/resistant than standard MDF board. It is completely moisture resistant, provided the correct finish is applied. Valchromat® increases the life span of tools used in its manufacturing due to a lubricant agent in its composition.

ADVANTAGES FOR ARCHITECTS AND DESIGNERS

Uniqueness

Valchromat® is a “one of a kind” product, and Valbopan are the only company in the world who produce it. It is not only unique for its look and colour, but for its diverse extensive application possibilities.

Natural look

Although it is essentially a manufactured product, Valchromat® has a texturised surface that gives it a very special look and feeling unlike artificially painted surfaces.

Variety

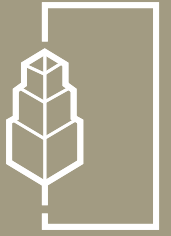
There are 8 different colours and 7 different thicknesses. Corporate colours can be manufactured at a minimum order of 100m³ but we cannot go lighter than our standard yellow as the dyes are toxic and expensive and the results are poor.

Wear and Tear

Due to Valchromat® being coloured consistently all the way through, the panels can be scratched a number of times, but they are easy to repair. All that is required is sanding and re-lacquering and they are back to brand new.

Different finishing possibilities

Valchromat® accepts any kind of finishing. By applying a glossy lacquer one can have a modern trendy look, and by applying oil one can create a slightly more conventional look. A mat or waxed look, and fire retardant and texturised finishes are all achievable using Valchromat®.



Easy to Assemble

During the planning stage of a project, architects and designers won't have to worry about hiding the edges. Valchromat® can be fitted without further finishing.

Non toxic

Valchromat® is classified E1 (Low on formaldehyde) according to European norms. There is a growing concern amongst MDF users since even the general purchaser for IKEA (furniture manufacturers) wants to exclude all the formaldehyde from their furniture. Valchromat® has been approved by the British standards association as safe to use in the manufacture of children's toys.

Sustainability

Our manufacture is very environment friendly – no waste water, no dangerous fumes, the use of waste from other manufacturers and the use of thin otherwise useless pine branches. Valchromat® can be recycled.

ADVANTAGES FOR MANUFACTURERS

High Density Profile

This characteristic is very important since it means that after machining, there is little or no sanding required, thus drastically reducing the cost of labour. This also allows an easier finishing, as fewer coats are required. It is enough to apply one coat of sealer followed by one or two coats of lacquer (although a little extra should be applied to the edges).

Moisture and UV Resistance

The panels have to be lacquered on all edges but Valchromat® may be used for kitchens, bathrooms and flooring. We have some customers using it externally, but it is best suited for interior applications.

Strength

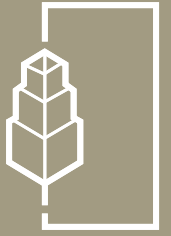
Valchromat® is at least 30% stronger than standard MDF making it a lot more stable.

Easy to Machine

Besides the fact that Valchromat® does not require sanding, it should also be remembered that Valchromat® has a much lower percentage of sand and metal. It also has a high melamine content that acts as a lubricant for the cutting tools, enabling them to last a lot longer. Valchromat® is entirely made of pine fibres extracted from Portuguese forests. The use of sub products such as branches, bark and residue from timber mills contributes to the sustained management of the planets forests.

Important Notes

- Small light brown pine chips are visible at random throughout a sheet of Valchromat® board, adding to its unique natural look!
- Whilst variances in colour remain within acceptable parameters, according to cielab norms allied to data colours software, it is important to note that slight variations may occur. This is due to the natural pine fibres and eco friendly organic dyes that make Valchromat® the innovative product it is!
- Sheet size available in SA: 2.5m x 1.85m
- Thicknesses available in SA: 8mm, 16mm, 22mm, 30mm
- Grey and Orange are currently not available in 22mm
- Tonal variance will occur with different finishing applications



MANUFACTURING

Raw Materials

From the very beginning a rigorous selection of raw material is carried out. Wood, pigments and glues are carefully selected. Valchromat® is made exclusively of pine wood. The glue is exclusively developed for Valchromat® in association with a resin manufacturer. It is mainly made of a synthetic resin formed by melamine-urea-formaldehyde.

Valchromat® is certified E1 (Low on formaldehyde). Exhaustive research was carried out in order to obtain colour stability, minimum toxicity whilst keeping in mind ecological factors. Valchromat® is therefore entirely made up from organic pigments like those used in the children's textile industry, and thoroughly complies with the strict eco-tex regulations.

Fibre preparation

The wood is peeled from the bark and sent into a chopper to be torn into small chips. The chips are then run through a very powerful magnet (this removes about 99% of all metal) followed by a washing stage which removes 80-90% of all the sand – this reduces the wear and tear of tools when cutting or machining. Once the chips have been sorted to similar sizes, they are cooked with steam (pressure and temperature). The chips are now soft but the fibres still need to be isolated by defibration (two gigantic texturised discs spine against each other to isolate the fibres). Pigments are prepared in-house, using an electronic supervising system which has been specifically developed for the manufacturing of Valchromat® and which rigorously controls the mix of all chemical products involved in the making of the glue.

Pressing

When the mixture of coloured fibre and glue dries, the Valchromat® is pressed in a large dimension monoplate press, forming large sized sheets. This press stage ensures that Valchromat® has a better density profile thus allowing more stability and better finishing properties.

Colour

Valchromat®'s colour is obtained by adding organic pigments to wood fibre providing a thoroughly uniform coloured piece of wood. It is equally resistant to daylight and artificial light. Colour quality control is explained below. Finish: After a 48 hour period sheets are calibrated at a homogenous thickness (0.1mm or 0.2mm), and mechanically polished. At this stage each sheet's colour is subject to a spectrophotometric control and classified according to the variation allowed for each colour.

Quality Control

For colour control, spectrophotometric technology allied to datacolour's software is used, as it is widely accepted by both the paint and textile industries. Its regulation complies with cielab norms. For other testing Valchromat® then applies standard cen tests designed for fibre panels. It was in this text that Valbopan together with manufacturing specialists, architects and designers set up the Valchromat® specifications designed to comply with EN (European) regulations. During the manufacturing process main features such as colour, internal strength and humidity resistance are regularly tested (at least once an hour) to allow for any necessary adjustments. Once the manufacturing process is complete Valchromat® features are once again thoroughly tested.

**PROPERTIES****Density and technical details according to EN (European) standards**

| thickness | 8 | 12 | 16 | 19 | 22 | 25 | 30 | Unit |
|---------------------------------|------|------|------|------|------|------|------|-------------------|
| density | 0,80 | 0,79 | 0,76 | 0,75 | 0,73 | 0,69 | 0,69 | g/cm ³ |
| swell ₈ | 10 | 7 | 5 | 5 | 5 | 5 | 4 | % |
| internal bond | 1,10 | 1,10 | 1,10 | 1,00 | 0,95 | 0,90 | 0,85 | N/mm ² |
| bending strength | 30 | 30 | 30 | 30 | 30 | 22 | 22 | N/mm ² |
| modulus of elasticity | 2700 | 2500 | 2500 | 2500 | 2500 | 2300 | 2300 | N/mm ² |
| thickness swell | 17 | 16 | 15 | 15 | 15 | 10 | 10 | % |
| internal bond after cyclic test | 0,30 | 0,25 | 0,20 | 0,20 | 0,15 | 0,10 | 0,15 | N/mm ² |

Cyclical testing

Cyclical tests – moisture resistant test standard EN 321 - Tests are repeated twice

| | temp(°C) | hours |
|---------|------------|-------|
| water | 20 | 72 |
| freezer | -12 to -20 | 24 |
| oven | 70 | 72 |

Colour fastening

Tests for resistance to artificial light are done under British standard norms (BS 1006) – 24 hours in a solar box.

| colour | reference | result |
|--------|-----------|--------|
| yellow | syw | 4 |
| black | sbl | 4 |
| blue | srb | 4 |
| brown | sbr | 5 |
| green | sgr | 2 |
| red | ssc | 3 |

**MATERIAL SAFETY DATA SHEET FOR VALCHROMAT****Storage and transportation**

Storage and transportation should be carried out in accordance with the EPF recommendations for MDF, no special precautions need to be taken. For transportation, Valchromat® is classified as a non hazardous product; no labeling required.

Handling and machining Valchromat

The usual safety requirements for fabrication and machining should be observed with regard to dust extraction, dust collection and fire precautions. Because of the possibility of sharp edges, protective gloves should be worn when handling panels. Although the contact with dust from Valchromat® does not present any special problem, a small percentage of personnel might be sensitive or even allergic to machining dust in general.

Environmental and health aspects in use

Valchromat® is chemically inert. Gas release from surfaces and edges is so low that they are not detectable by instrumental analysis. Formaldehyde emission is below the limit for wood-based materials. There is no migration affecting the foodstuffs and consequently, Valchromat® is approved for contact with foodstuffs. The surfaces are resistant to all common household solvents and chemicals and therefore, have been used in many applications where cleanliness and hygiene are important.

Maintenance

Although it depends on the desired final look of the panels, Valchromat® can be used such as it is, without any surface protection (like lacquers or paints).

Valchromat in fire situations

The panels are difficult to ignite and have properties that retard "spread of flame", thus prolonging evacuation time. Due to incomplete burning, as with any organic material, hazardous substances are to be found in the smoke. However Valchromat® is classified Euroclass D (smoke class s1, drop class d0) according to EPF regulations. In dealing with fires in which Valchromat® is involved the same fire fighting techniques should be employed as with other wood-based building materials.

Waste disposal

Valchromat® can be brought to controlled waste disposal sites according to current national and/or regional regulations. However there are two other alternatives: recycling (Valbopan has the patent for this process); energy recovery in approved industrial incinerators.

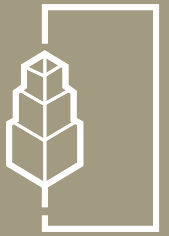
**Technical data****Physical-chemical characteristics**

| | |
|------------------------|--|
| Physical state | Solid sheet |
| Density | 0,76 g/cm ³ (varies considerably in different thicknesses) |
| Solubility | Insoluble in water, oil, methanol, diethyl ether, n-octanol, acetone |
| Boiling point | None |
| Evaporation rate | None |
| Melting point | Doesn't melt |
| Heavy metals | Valchromat® doesn't contain toxic compounds of antimony, barium, cadmium, chromiumIII, chromiumVI, lead, mercury, selenium |

Stability and reactivity data

| | |
|---|---|
| Stability | Very stable |
| Hazardous reactions | Not reactive nor corrosive |
| Material incompatibility | Strong acids or alkaline solutions will stain the surface |
| Fire and explosion data | Ignition temperature Approx. 375 °C |
| Thermal decomposition | Possible above 220 °C. Depending upon the burning conditions (temperature, amount of oxygen, etc...) toxic gases may be emitted, e.g. carbon monoxide, carbon dioxide, ammonia |
| Flammability | Valchromat® isn't considered to be flammable. They will burn only in fire situation, in presence of open flames |
| Extinguishing media | Valchromat® is considered as a class A material. Carbon dioxide, water spray, dry chemical foam can be used to extinguish flames. Water dampens and prevents rekindling. Wear self breathing apparatus and protective clothing. |
| Protection against fire explosion | None required as for wood based building materials. |
| Storage and transport | Valchromat® is classified as non-hazardous for transportation purposes and there are no specific requirements. |
| Machining | Use gloves to protect from sharp edges and edges and safety-glasses to prevent eye injury. No special working equipment is necessary, except protections to minimize dust exposure in case of sheet machining. |
| Disposal considerations | Waste material shall be handled according to local regulations. Burning is approved in industrial incinerators. Valbopan has the patent for recycling Valchromat. |
| Health information | Valchromat® is not dangerous for humans and animals. There is no evidence of Valchromat® toxicological effects and eco-toxicity. Valchromat® surfaces are physiologically safe and approved for contact with foodstuffs. |
| Working areas | General dust regulations apply. Although Valchromat® dust is thinner than usual. |
| Formaldehyde emission | ←8mg when tested according to EN120 (perforator method) |
| Additional remarks | Valchromat® are solid sheets and there are would not be any health hazards associated with them. |

All the above information is based on the current state of technical knowledge, but does not constitute any form of guarantee. It is the personal responsibility of users of the product described in this information leaflet to comply with the appropriate laws and regulations.



FORMULA FOR BOWING OF VALCHROMAT SHELVES SUPPORTING WEIGHT

There is a formula, based on several factors, that gives one an idea of the “worst case scenario”, If the distance between supports is 1000mm then, the worst situation would be to have a bow of 1mm, which might be too much! With a support every 500mm, there should be no bending to bear this load. If you maintain this distance between supports it will only support approximately 4Kg without bending.

| total wieght | distance supports | mod elasticity | width | thickness | acceleration | bending | bending |
|--------------|-------------------|----------------|-------|-----------|--------------|---------|---------|
| kg | mm | N/mm2 | mm | mm | m/s2 | mm | cm |
| W | L | E | b | t | a | d | d |
| 20 | 1000 | 2700 | 300 | 8 | 9.81 | 73.9 | 7.4 |
| 20 | 1000 | 2500 | 300 | 12 | 9.81 | 23.7 | 2.4 |
| 20 | 1000 | 2500 | 300 | 16 | 9.81 | 10.0 | 1.0 |
| 20 | 1000 | 2500 | 300 | 19 | 9.81 | 6.0 | 0.6 |
| 20 | 1000 | 2500 | 300 | 22 | 9.81 | 3.8 | 0.4 |
| 20 | 1000 | 2300 | 300 | 25 | 9.81 | 2.8 | 0.3 |
| 20 | 1000 | 2300 | 300 | 30 | 9.81 | 1.6 | 0.2 |



$$\text{difference between straight and bent =bending} = \frac{5 \times W \times L^3}{32 \times E \times b \times t^3}$$