# Technical File

*Wood-based panels*

*Panneaux à base de bois*

valchromat

*Painel de fibras*
*Fibreboard*
*Tableros de fibras*
*Panneaux de fibres*
*Faserplatten*


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# 1. DESCRIPTION

## 1.1 Description and range

Valchromat® A Forest of Colour

Valchromat is a panel made of wood fibres coloured in the production process. The fibres are impregnated with organic colouring agents and chemically bonded by a special resin which lends Valchromat unique physical-mechanical features.

Due to the use of organic colouring agents and the natural variation of wood colour, the Valchromat panel comes in different shades. This variation can be observed on the same surface, between the surfaces of the same panel or the different production batches or thicknesses.

Valchromat is included in the technical class of MDF.HLS, a load-bearing board for use in moist conditions. It is supplied with no finish and therefore the application of a layer of varnish, wax, or oil is recommended.

The production of the Valchromat fibreboard complies with the EN 622-5 and EN 13986 Standards, and holds an CE Marking Certificate.

The Valchromat panel is resistant to fire category D-s2,d0. Valbopan also manufactures a panel called Valchromat Fire Retardant which is of Fire Reaction Class B-s2, d0.

## 1.2 Materials used in manufacturing

Wood: Pine Wood;

Resin: Melamine-urea-formaldehyde resin (MUF), with low formaldehyde content (Class E1);

Wax: Paraffin emulsion;

Colouring agents: Organic colorants.

## 1.3 Dimensions

Manufacturing dimensions:

| Metric (mm) | Imperial (inch) |
|---|---|
| 2440x1220 | 96x48 |
| 2440x1830 | 96x72 |
| 3660x1220 | 144x48 |
| 3660x2440 | 144x96 |

## 1.4 Cutting tolerances

| | Metric | Imperial |
|---|---|---|
| Length and width | ± 2 mm/m<br>max. 5 mm | ± 0.08”<br>max. 0.2” |
| Squareness | 2 mm/m | 0.20 % |
| Edge straightness | 1.5 mm/m | 0.15% |

## 1.5 Colours

The Valchromat panel is produced in different colours. The colouring of the panels is carried out during manufacture, by adding an organic colouring agent to the wood fibres.

See the Valchromat panel Technical Data Sheet: www.investwood.pt

## 1.6 Thickness and thickness tolerances

| Thickness | | Tolerance | |
|---|---|---|---|
| mm | inch | mm | inch |
| 8 | 5/16 | ± 0.2 | ± 0.008 |
| 12 | 1/2 | ± 0.2 | ± 0.008 |
| 16 | 5/8 | ± 0.2 | ± 0.008 |
| 19 | 3/4 | ± 0.3 | ± 0.012 |
| 30 | 1 3/16 | ± 0.3 | ± 0.012 |

## 1.7 Features

See Technical Data Sheet or Table 1 in this document.

## 1.8 Other features

**Moisture**

Upon leaving the factory: 4-11%

**Formaldehyde**

Formaldehyde class: E1

**Asbestos**

Does not contain.

**Pentachlorophenol**

Does not contain.

## 1.9 Sound isolation

Sound reduction index $R = 13 + \log_{10}(mA) + 14$

EN 13986:2004+A1:2015

Valid for frequencies between 1 kH and 3 kH.

| Thickness | | Surface weight | R |
|---|---|---|---|
| mm | inch | Kg/m2 | dB |
| 8 | 5/16 | 6.8 | 24.8 |
| 12 | 1/2 | 9.8 | 26.9 |
| 16 | 5/8 | 12.8 | 28.4 |
| 19 | 3/4 | 15.0 | 29.3 |
| 30 | 1 3/16 | 22.2 | 31.5 |

## 1.10 Weight

Specific weight: See Chart 1

Metric System

| Thickness (mm) | 8 | 12 | 16 | 19 | 30 |
|---|---|---|---|---|---|
| Weight/m2 (kg/m2) | 6.8 | 9.8 | 12.8 | 15.0 | 22.2 |
| Weight of panels (kg) | | | | | |
| 2440 x 1220 mm | 20.2 | 29.3 | 38.1 | 44.7 | 66.1 |
| 2440 x 1830 mm | 30.4 | 43.9 | 57.2 | 67.0 | 99.1 |
| 3660 x 1220 mm | 30.4 | 43.9 | 57.2 | 67.0 | 99.1 |
| 3660 x 2440 mm | 60.7 | 87.9 | 114.3 | 134.0 | 198.3 |

Imperial System

| Thickness (inch) | 5/16 | 1/2 | 5/8 | 3/4 | 1 3/16 |
|---|---|---|---|---|---|
| Weight/sqm (psf) | 1.39 | 2.01 | 2.62 | 3.07 | 4.55 |
| Weight of panels | (lb) | | | | |
| 96x48 " | 44.4 | 64.5 | 83.8 | 98.3 | 145.4 |
| 96x72 " | 66.9 | 96.6 | 125.8 | 147.4 | 218.0 |
| 144x48 " | 66.9 | 96.6 | 125.8 | 147.4 | 218.0 |
| 144x96 " | 133.5 | 193.4 | 251.5 | 294.8 | 436.3 |

## 1.11 Packaging

Number of panels per pallet

| Thicknesses | 8mm 5/16 " | 12mm 1/2 " | 16mm 5/8 " | 19mm 3/4 " | 30mm 1 3/16" |
|---|---|---|---|---|---|
| 2440 x 1220 mm 96x48 " | 90 | 60 | 45 | 39 | 24 |
| 2440 x 1830 mm 96x72 " | 60 | 40 | 30 | 26 | 16 |
| 3660 x 1220 mm 144x48 " | 60 | 40 | 30 | 26 | 16 |
| 3660 x 2440 mm 144x96 " | 30 | 20 | 15 | 13 | 8 |

## 1.12 Quality control in production

Valbopan Fibras de Madeira S.A. is a company attributed with the CE Marking Certificate, so all tests are carried out in order to comply with the characteristics required by European standards.

Any material that does not meet the requirements is considered "Non-Conforming" and does not carry the CE Marking Certificate.

**Final product**

- Thickness, on all panels;
- Dimensions;
- Squareness;
- Edge straightness;
- Density;
- Bending strength;
- Modulos of elasticity in bending;
- Internal bond;
- Swelling in thickness;
- Internal bond after cyclic test;
- Swelling in thickness after cyclic test;
- Panel humidity.

## 1.13 Pallet identification

All pallets are identified with a label containing the following data:

- Panel name;
- Investwood website;
- CE Marking;
- Thickness;
- Length and width of panels;
- Number of panels;
- Name of the Client
- Destination.

## 1.14 Surface calibration

| Thickness | | Sandpaper grit |
|---|---|---|
| mm | inch | |
| 8 and 12 | 5/16 and 1/2 | 180 |
| 16, 19 and 30 | 5/8, 3/4 and 1 3/16 | 150 |

## 1.15 Storage

When ready for transport, the panels are piled up on pallets, strapped and with labelled with cardboard identification.

Pallet straps should only be removed to acclimatise the panels to the place of application.

Valchromat panels must be stored in a roofed area, protected from sunlight and rain, on a horizontal flat base. The pallets must be placed on supports of sufficient height (≥9 cm) to allow easy access with a forklift truck. The maximum distance between the supports should not exceed 800mm and the maximum distance between the 1st support and the top of the pallet should not exceed 210mm.

If the pallets are piled on top of each other, all the support bases must be aligned to prevent deformation.

Piling up to a maximum of 4 metres high is allowed (see figure 1.1).

## 1.16 Handling

Whenever possible, the panels should be handled using appropriate equipment, such as forklift trucks or panel lifters, etc.

When the panels have to be manually moved, they must be moved one by one, in the vertical position, in order to remain level without bending (view Figure 1.2).

The panels are heavy, so they should not be moved without a sufficient number of people.

Good manual handling practices should be followed using appropriate personal protective equipment and complying with the rules of the European Safety and Health Legislation, Osha.Europa.eu (Fact-sheet 73):

https://osha.europa.eu/pt/tools-and-publications/publications/factsheets/73/view

## 1.17 Acclimatisation

Upon leaving the factory, the panel has a moistness that varies from 4% to 11%.

To ensure proper installation, the panel must adapt to the temperature and humidity conditions of the installation site. To do so, the straps surrounding the pallets must be cut. The panels must remain 72 hours (3 days) to acclimatise to the installation site before being applied.

The panels at the top of the pallets, whose straps have already been removed, may warp, curving upwards. This phenomenon is natural and happens due to the differential loss of moisture between the two surfaces. However, the process is reversible. The panel becomes flat again when both surfaces have balanced humidity. To do this, turn around the panel and keep it that way until the balance is reached (see figure 1.3).

## 1.18 Moisture Resistance

The Valchromat panel is a moisture resistant panel belonging to the technical category MDF.HLS. It is a load-bearing panel for use in humid conditions.

The panel does not deteriorate in humid conditions. However, if it is not protected with a varnish, fungus and mould may form which will alter the appearance of the panel.

## 1.19 Cutting, drilling and machining

Panels can be cut, drilled and machined with power tools or compressed air normally used in mechanical carpentry or metalwork.

The cutting, drilling and machining of Valchromat panels releases dust, so appropriate personal protective equipment such as masks, gloves, goggles, etc. should be used.

**Cutting**

Valchromat panels should be cut using circular saws with tungsten cutting disc (see figure 1.4).

A horizontal cutting bench should be used when making multiple cuts or cutting panels with a thickness of 19 mm or higher. The cutting bench will make the work more productive.

**Drilling**

Drilling should be performed with drills in "non-impact" mode using HSS 3-point drills suitable for drilling wood (see figure 1.5).

**Machining of edges**

Simple machining of the edges can be performed on site using a portable router (see figure 1.6).

Using the correct cutters, the edges can be milled in different ways: bevelled, grooved, etc. (see figure 1.8).

With the correct equipment, it is possible to make tongue and groove and half-lap edges.

## 1.20 Finishes

A finish should be applied to Valchromat panels to protect the surface, keeping its natural look. Varnishes, waxes or oils can be used for the finish.

When applied in humid environments, Valchromat panels should be varnished to maintain their appearance throughout their lifespan and to make it easy to clean them.

Fungus and mould stains are more likely to appear in unvarnished panels when placed in humid environments. These stains can be cleaned by sanding the affected surfaces mechanically, but complete removal is not always possible depending on the depth of the stain.

Before applying any type of finish, the surfaces of the panels must be properly prepared, removing all dirt, dust and grease.

## 1.21 Surface preparation

Given the differences in shades between panels in the same batch, before starting a job the panels should be arranged side by side, arranging them to try to minimise the differences between adjacent panels.

In general, any finish, be it varnish, wax or oil, requires prior preparation of the surface. This preparation consists of sanding the surfaces and the tops with fine sandpaper before applying the finish.

The process should be gradual, increasing the grain of the sandpaper by 50% with each new step. It is recommended to use at least 2 steps with 2 different grains of sandpaper.

Valchromat panels come factory-sanded with 150 or 180 grain sandpaper, depending on the thickness, so the recommendation for surface preparation is to start with 220grain sandpaper and finish with 320 grain sandpaper. The tops should also be treated.

The panels may be sanded in the workshop or on site using an orbital sander (see figure 1.7).

Before applying the finish, the panels should be cleaned with a dry cloth, air blowing or preferably air suction to remove all dust, which could otherwise damage the finish.

## 1.22 Varnish

Of the three types of finishes described, varnishes are the most complex and often the most difficult to choose, due to the wide range of products available. Any varnish that is suitable for wood can be applied on Valchromat. Acrylic and Aliphatic Polyurethane varnishes are widely used as they do not turn yellow over time. Aqueous-based varnishes change the natural colour of the panel less than solvent-based varnishes.

When the panel is varnished, the first coat applied is a primer. After the primer has dried, the surfaces are sanded with 320 grit sandpaper in order to remove any repellence and granulometry that may arise.

A new coat of primer or finishing varnish is then applied, according to the manufacturer's instruction.

Between coats, the surfaces are sanded with 320 grit sandpaper.

There are finishing varnishes with different types of gloss, from glossy to matte.

We recommend that the primer and varnish come from the same manufacturer so that there are no incompatibilities.

## 1.23 Waxes and Oils

Waxes and oils are usually applied in a single coat or several coats on the previously prepared surfaces.

These types of finishing should not be applied to panels that may be installed in humid environments, such as kitchens and bathrooms.

## 1.24 Application

Valbopan Fibras de Madeiras S.A. is the manufacturer of Valchromat panels and does not apply the finish. The panels can be purchased from an authorised distributor directly by the contractors or subcontractors who carry out the application.

The fixings, glues, support structure, finishes or any other element can be acquired directly by the installation company, provided that they comply with all the characteristics specified in this Technical File.

Table 1 shows a summary of the various applications and recommended thicknesses.

Valchromat panels are only suitable for indoor use.

## 1.25 Maintenance

Valchromat panels do not require maintenance.

In applications where the panel is finished with a varnish, wax or oil, the need to adopt a maintenance plan should be evaluated in order to maintain the attractive appearance of the finish.

As part of a good maintenance practice, an inspection should be carried out every 2 years in order to check that the finishes are in good condition.

When considerable wear or a deficiency is detected in the finish of the panel, it must be cleaned, the surfaces sanded with fine sandpaper and the finish reapplied.

## 1.26 Technical support

Valbopan Fibras de Madeira S.A. has an Investwood Technical Department, which can provide technical assistance both in the design phase and the execution phase of the work.

## 1.27 Dimensional variation

The dimensions of the Valchromat panels are modified with the variation of the water content.

In tests carried out in line with the EN 318 standard, on 19 mm thick Valchromat panels of various colours, the following dimensional variations were observed for a constant temperature of 20±1 ºC, and variation in the relative environmental humidity.

| Temperature 20 ºC / 68 ºF<br>Water content variation | Variation of panel size<br>δl | |
|---|---|---|
| 65% → 85% | 0.9 mm/m | 0.9 ‰ |
| 65% → 30% | -1.6 mm/m | -1.6 ‰ |

## 1.28 Formaldehyde emissions

As part of our efforts to continuously improvement the Valchromat panels, solutions are tested that increasingly lead to lower emissions of formaldehyde, which are harmful substances to the health of individuals and the environment.

Currently all Valchromat panels are of formaldehyde class E1 according to European regulation EN 13986, where formaldehyde emissions are limited to 0.10 ppm (EN 717-1) whose factory control value is 8 mg/100g (EN 120).

Valchromat CARB panels, in accordance with the provisions of the United States Environmental Protection Agency (EPA), comply with the limits of formaldehyde emissions at 0.11 ppm (ASTM E1333-14), with CARB ATCM Phase II and TSCA Title VI compliant certification.

## 1.29 FSC and PEFC certification

Valbopan S.A. holds the Chain of Responsibility Certification (CdR), according to the PEFC and FSC regulatory frameworks. Valchromat can provide panels with these certifications upon request.

## 1.30 Declaration of Performance (DoP)

Under Regulation (EU) No 305/2011 of the European Parliament and the Council, which sets the harmonised conditions for the sale of construction products, the Valchromat panel holds a CE Marking Certificate and it fulfils all the characteristics and properties stated in the Declaration of Performance.

The Declaration of Performance (DoP) may be downloaded from the Investwood website.

# 2. PARTITION WALLS AND INTERIOR WALL CLADDING

Valchromat panels can be used to make partition walls or interior wall cladding. When applied to interior partition walls they can be varnished or installed without finishing. It is the installer's responsibility to check the safety conditions of the support structure, namely the distance between supports and the width of the supports for proper panel installation.

Valchromat panels undergo small dimensional variations with the variation of relative air humidity and temperature, as mentioned in section 1.27.

Therefore, the recommendations given must be followed, taking into account the thickness of the panel, the type of finish and the location of the fixings.

If the screws are placed too close to the edges the panel may break.

**Elements that make up partition walls and wall cladding**

- Panels;
- Support structure, made of wood or metal;
- Glues, screws, rivets or nails for fixing the panels to the support structure;
- Acoustic insulation.

## 2.1 General features

**Application**

Valchromat panels can only be used indoors.

**Thickness and finishes**

| Thickness | | Panel sealing | Application areas |
|---|---|---|---|
| 8 mm | 5/16 ” | With varnish | Dry Zones |
| 12 mm | 1/2 ” | No varnish | Dry Zones |
| 12 mm | 1/2 ” | With varnish | Humid Zones |

**Panels dimension**

| Metric (mm) | Imperial (inch) |
|---|---|
| 2440x1220 | 96x48 |
| 2440x1830 | 96x72 |
| 3660x1220 | 144x48 |
| 3660x2440 | 144x96 |

Any intermediate dimensions are possible by cutting the standard dimension panels.

**Dimensional tolerances of panels**

| Thickness | | Tolerance | |
|---|---|---|---|
| mm | inch | mm | inch |
| 8 | 5/16 | ± 0.2 | ± 0.008 |
| 12 | 1/2 | ± 0.2 | ± 0.008 |

**Cutting tolerances**

| | Metric | Imperial |
|---|---|---|
| Length and width | ± 2 mm/m<br>max. 5 mm | ± 0.08”<br>max. 0.2” |
| Squareness | 2 mm/m | 0.20 % |
| Edge straightness | 1.5 mm/m | 0.15% |

## 2.2 Fasteners

The panels can be fixed with glues, screws, rivets or nails depending on the type of structure.

**Mastic adhesives**

Mastic gluing systems can be used to glue Valchromat panels to wood and metal structures. This type of fixation consists of:

- Adhesion primer for the support structure;
- Adhesion primary for Valchromat panel;
- Double-sided adhesive tape;
- Mastic adhesive.

The adhesive tape has a thickness of 3 mm (0.12”), whose function is to fix the panels while the mastic is fresh, that is, without resistance. This ensures a thickness of 3 mm (0.12”) from mastic adhesive without being crushed, see figure 2.1.

The panels should be fixed with a maximum distance of every 60 cm (24”), see figure 2.2.

Sika and Bostik have mastics suitable for this application. The manufacturers of these materials should always be consulted for the best advice and correct application.

**Screws**

Screws to fix to a wooden structure should have a minimum anchorage length (depth embedded in the wood) of 20mm (0.80”), see figure 2.3.

When the support structure is metal, in addition to the proper length of the screw body, the drill tip must have a suitable dimension to drill the thickness of the metal it will fix to, see figure 2.4.

When fastening with screws, the maximum distance between screws should not exceed 600 mm (24”) and the distance to the edge of the panel should also be respected, see figure 2.5.

Other types of screws may be used as long as they have equal performance and durability.

The screws must be stainless steel or alternatively the zone where they shall be used must have corrosion protection.

**Rivets**

For metallic structures, rivets may be used to fix the panels to the structure, see figure 2.6.

When fastening with rivets, the maximum distance between the rivets shall not exceed 600 mm (24”) and the distance to the panel edge shall also be respected, see figure 2.5.

Rivets can be applied with a manual, electric or compressed air riveter.

**Nails**

As they are made from wood, stainless steel or galvanized steel nails can be used to fix the panels.

Headless nails are available, which are practically invisible, see figure 2.7.

When fixing with nails, the distance between each one should not exceed 600 mm (24”) in the horizontal direction or 400 mm (16”) in the vertical direction, and the distance of the nails to the edge of the panel should also be respected, see figure 2.8.

Nails should be applied by using an appropriate pneumatic gun. Before starting the final fastening of the panels, a series of tests should be performed in order to regulate the adequate pressure and force for correct nail insertion, see figure 2.9.

#### VHB adhesive tape

A variant of the mastic bonding system is the use of double-sided VHB adhesive tape manufactured by 3M, see figure 2.10.

The 3M manufacturer should be consulted.

#### Dual-Lock Tape

Removable panels may be fixed with Dual-Lock adhesive tape manufactured by 3M, see figure 2.11.

The 3M manufacturer should be consulted.

## 2.3 Partition walls

#### Support structure

Valchromat panels can be supported on wooden structure or galvanized steel sections. Figures 2.12 and 2.13 show the type sections of wooden beams and galvanized steel sections that may be used. Other types of sections may also be used, provided that they maintain equal strength and durability.

The support structure should have a sufficient width to allow the correct positioning of the fixings, respecting the minimum distances between the screws and the edge of the panels, which is 15 mm (0.60”) for wooden beams (see figure 2.14) and 10 mm (0.40”) for metal profiles, see figure 2.15. In addition, it must also have the capacity to absorb minor positioning errors.

It should be noted that in the area of the joint between panels, when the structure is made of galvanized steel, it is normal to double the sections in this area in order to respect the distance of the screws to the edges.

The maximum distance between the axes of the supporting elements is 600 mm (24”). Their alignment must be checked between adjacent elements and must not present differences greater than 5 mm (0.20”).

If the support structure is wood, according to EN 338 standard, it will be at least of Class C18 Resistance.

If the support structure is galvanized steel, according to EN 10327, the section class shall be at least DX51D (Z+) and the thickness of the steel plate should be 1 mm (0.04”).

The dimensioning of these elements should take into account that deformations caused by their use must not affect the normal functioning of the wall. The deformation must not exceed the L/300 limit of the gap between fixations of these elements.

Sections used on plasterboard walls, even if they have identical geometric shape, are not suitable to support Valchromat panels.

#### Horizontal section

Figures 2.16 and 2.17 represent horizontal sections of partition walls with a wooden and a galvanized steel structure respectively. Figure 2.18 represents a vertical cut of a structure in wood and galvanized steel.

## 2.4 Wall cladding

#### Support structure

The support structure for a wall lining can made from wood or galvanized steel sections. Figures 2.19 and 2.20 show model sections used. Other sections may be used provided that they are equally resistant and durable.

The structure that will support the Valchromat panels has to be properly aligned and positioned. If the wall to be covered is very misaligned, it may be necessary to straighten the support structure using support brackets.

The support structure must be sufficiently wide to allow the correct positioning of the anchorages, respecting the minimum distances between the screws and the edge of the panels, which is 15 mm (0.60”) for the wooden beams, see figure 2.14, and 10 mm (0.40”) in the metal sections, see figure 2.15. In addition, it must also have the capacity to absorb minor positioning errors.

The maximum distance between the axes of the supporting elements is 600 mm (24”). Their alignment must be checked between adjacent elements and must not present differences greater than 5 mm (0.20”).

If the support structure is wood, according to EN 338 standard, it will be at least of Class C18 Resistance.

If the support structure is galvanized steel, according to EN 10327, the section class shall be at least DX51D (Z+) and the thickness of the steel plate should be 1 mm (0.04”).

The dimensioning of these elements should take into account that the deformations caused by their use must not affect the normal functioning of the wall. The deformation must not exceed the L/300 limit of the gap between fixations of these elements.

#### Horizontal section

Figures 2.21 and 2.22 depict horizontal sections of wooden and galvanized steel frame walls respectively. Figure 2.23 represents a vertical cut of a wall covering with a wooden or galvanized steel structure.

## 2.5 Joints between panels

The joints between panels should include a gap of 1 to 3 mm (0.04” to 0.12”) and can be filled with silicone or mastic, see figures 2.24 and 2.25.

## 2.6 Panel edges

The edges of the panels can be machine worked in the form of a bevel of 1 to 3 mm (0.04” to 0.12”), see figure 2.26 and 2.27.

## 2.7 Surface finishing

The panel should only be applied without varnish in dry areas and with a thickness of 12 mm (1/2”). When applied in damp areas with a maximum relative humidity of 85%, it should be varnished.

In order to protect the surfaces and facilitate maintenance cleaning, it is recommended that the Valchromat panel is varnished with a varnish suitable for wood.

The rear surface of the panel should be sealed with the primer, while the visible surface and the tops should be varnished with the number of coats necessary, as indicated by the manufacturer.

# 3. FLOORS

The Valchromat panel is technically classified as an MDF.HSL, a load bearing panel for use in humid conditions.

Due to their characteristics, Valchromat panels can be used as floor support and a finishing surface, whether they are placed on beams or used as the floor lining material on top of a new or existing surface.

When supported on beams (wood or metal), the maximum distance between the beams is 600mm (24”).

It is the installer's responsibility to check the safety conditions of the support structure, namely the distance between the supports and the width of the supports to ensure proper panel installation.

Valchromat panels undergo small dimensional variations with the variation of relative air humidity and temperature, as indicated in section 1.27.

Therefore, the recommendations should be followed, taking into account the thickness of the panel, the type of finish and the location of the fixings.

Screws, when placed too close to the edges, may cause the panel to break, so the distances between fixing elements must be taken into consideration, as shown in figure 3.1.

## 3.1 Supported on beams

**Application**

Valchromat panels can only be used indoors.

**Thickness**

Minimum 19 mm (3/4”)

**Size of panels**

| Metric (mm) | Imperial (inch) |
|---|---|
| 2440x1220 | 96x48 |
| 2440x1830 | 96x72 |
| 3660x1220 | 144x48 |
| 3660x2440 | 144x96 |

Any intermediate dimensions are possible by cutting the standard dimension panels.

**Cutting tolerances**

| | Metric | Imperial |
|---|---|---|
| Length and width | ± 2 mm/m<br>max. 5 mm | ± 0.08”<br>max. 0.2” |
| Squareness | 2 mm/m | 0.20 % |
| Edge straightness | 1.5 mm/m | 0.15% |

### 3.1.1 Location of screws

The fixing of the panels with screws next to the edges must take into account the minimum distances, as shown in Figure 3.1.

A screw placed too close to the edge may cause the panel to break.

The joints between the panels should be misaligned, as shown in Figure 3.2.

### 3.1.2 Support structure

Valchromat panels can be supported on a wooden or metal structure. The panels must be positioned so that their longitudinal length is perpendicular to the orientation of the supporting structure. The structure that will support the Valchromat panels must be properly aligned and levelled.

The support structure must be wide enough to allow the correct positioning of the fixings, respecting the minimum distances between the screws and the edge of the panels and have the capacity to absorb small positioning errors (see figure 3.1).

The maximum distance between the axes of the support elements (spans) will be 600mm (24”). The alignment should be checked between adjacent elements and the gap should not be more than 5 mm (0.20”).

### 3.1.3 Fasteners

The panels can be fixed with screws, nails or glued with a mastic gluing system.

**Screws**

When the support frame is wooden, the screws should have a minimum anchor length (depth embedded in the wood) of 30mm (1 3/16”).

When the support structure is metal, in addition to the proper length of the screw, the drill tip will must have an appropriate dimension to pierce the thickness of the metal where it will be fixed.

Figures 3.3 and 3.4 show screws that can be used to fix Valchromat panels.

**Nails**

As the panels are wood, stainless steel or galvanized steel nails can be used to fix them.

Headless nails are available, which are practically invisible, see figure 3.5.

When fixing with nails, the distance between anchorages should not exceed 600 mm (24”) in one direction and 400 mm (16”) in the perpendicular direction, the distance of the nails to the edge of the panel should also be respected, see figure 3.6.

Nails should be inserted using an appropriate pneumatic gun. Before starting the final fastening of the panels, a series of tests should be performed in order to regulate the adequate pressure and force for correct nail insertion, see figure 3.7.

**Mastic**

The mastic gluing systems can be used to glue Valchromat panels to wood and metal structures.

This type of fixation consists of:

- Adhesion primer for the support structure;
- Adhesion primer for Valchromat panels;
- Double-sided adhesive tape;
- Mastic adhesive.

The adhesive tape has a thickness of 3 mm (0.12”), whose function is to fix the panels while the mastic is fresh, that is, without resistance. This ensures a thickness of 3 mm (0.12”) from mastic adhesive without being crushed.

Sika and Bostik have mastics suitable for this application. The manufacturers of these materials should always be consulted for the best advice and correct application, see figure 3.8.

### 3.1.4 Basis of design

The design of Valchromat panels is carried out in accordance with the requirements of Eurocode 1 and 5, taking into account the National Application Documents.

For the Ultimate Limit State of Resistance, the following values should be adopted:

- Density (ρ);
- Bending strength ($f_{m,k}$);
- Partial safety factor $\gamma_{M=}$ 1.3
- Modification factor ($k_{mod}$)
  - Permanent actions, $k_{mod}$ = 0.20
  - Long-term actions, $k_{mod}$ = 0.40
  - Medium-term actions, $k_{mod}$ = 0.60
  - Short-term actions, $k_{mod}$ = 0.80

$$M_{Rd} = k_{mod} \cdot w \cdot f_{m,k} / \gamma_M$$

The following values should be adopted for the Design of the Limit of Deformation:

- Modulus of elasticity in bending ($E_m$);
- Deformation factor $k_{def}$ = 2.25
- Long-term deformation, $\delta_\infty = \delta_{instantaneous} \times (1+k_{def})$

The deformation of the panels must not jeopardize the normal functioning of the floors. The maximum deformation due to permanent loads and overloads should not exceed the L/250 limit of the span between supports.

In figures 3.9 and 3.10 you can see an example of a design.

Table 1 comprises a Load Table for quick design of floors. The use of this table does not exempt the need for a design verification.

## 3.2 Supported on ongoing support

**Application**

Valchromat panels can only be used indoors.

**Thickness**

Minimum 12 mm (1/2")

**Size of panels**

| Metric (mm) | Imperial (inch) |
|---|---|
| 2440x1220 | 96x48 |
| 2440x1830 | 96x72 |
| 3660x1220 | 144x48 |
| 3660x2440 | 144x96 |

Any intermediate dimensions are possible by cutting the standard dimension panels.

**Cutting tolerances**

| | Metric | Imperial |
|---|---|---|
| Length and width | ± 2 mm/m<br>max. 5 mm | ± 0.08"<br>max. 0.2" |
| Squareness | 2 mm/m | 0.20 % |
| Edge straightness | 1.5 mm/m | 0.15% |

### 3.2.1 Support structure

The Valchromat panel can be installed on a new or existing continuous support. In both situations, the support must be levelled and in good condition to support the Valchromat panel. The surfaces must be free from dirt or grease to ensure good adhesion.

### 3.2.2 Fasteners

The panels will be fixed to the support by means of an elastic polyurethane mortar, spread over the entire surface continuously with a notched trowel, see figure 3.11 and 3.12.

Sika and Bostik have suitable mortars for this application. The manufacturers of these materials should always be consulted for the best advice and correct application.

## 3.3 Surface treatment

The panels should be protected with scratch-resistant paint or varnish which is suitable for flooring.

Before applying the varnish on the panels, the surface should be completely clean and dry, without any grease, dust or salts. They should be cleaned as indicated in 1.19.

## 3.4 Joints between panels

The joints between panels should have an opening of 1 to 3 mm (0.04" to 0.12") and can be filled with silicone or mastic, see figure 3.13 and 3.14.

## 3.5 Panel edges

The edges of the panels may be machined-worked into bevel shapes measuring 1 to 3 mm (0.04" to 0.12"), see figure 3.15.

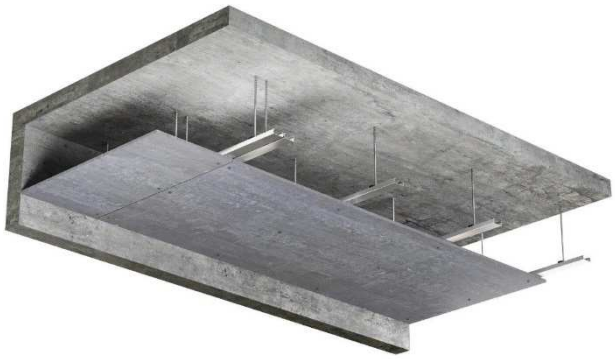
## 3.6 Surface finishing

In order to protect surfaces from wear and facilitate maintenance cleaning, it is recommended that the Valchromat panels be varnished with a varnish suitable for floors.

Whenever the rear surface of the panel is exposed, as in a floor supported on beams, it should be sealed with a primer.

The visible surface and the tops should be varnished with the number of coats needed, as indicated by the manufacturer.

# 4. FALSE CEILINGS



Valchromat panels are suitable to be used as a covering element for a false ceiling. The support structure will be made of galvanized steel or wood, with equidistant supports, whereby the distance should not exceed 600mm (24”).

It is the installer's responsibility to check the safety conditions of the support structure, namely the distance between the supports and the width of the supports for proper panel installation.

Valchromat panels undergo small dimensional variations with the variation of relative air humidity and temperature, as indicated in section 1.27.

Therefore, the recommendations should be followed, taking into account the thickness of the panel, the type of finish and the location of the fixings.

Screws, when placed too close to the edges, may cause the panel to break, so the distances between fixing elements must be taken into consideration, as shown in figure 4.1.

## 4.1 General features

**Application**

Valchromat panels can only be used indoors.

**Thickness and finishes**

| Thickness | | Panel sealing | Application areas |
|---|---|---|---|
| 8 mm | 5/16 ” | With varnish | Dry Zones |
| 12 mm | 1/2 ” | No varnish | Dry Zones |
| 12 mm | 1/2 ” | With varnish | Humid Zones |

**Size of panels**

| Metric (mm) | Imperial (inch) |
|---|---|
| 2440x1220 | 96x48 |
| 2440x1830 | 96x72 |
| 3660x1220 | 144x48 |
| 3660x2440 | 144x96 |

Any intermediate dimensions are possible by cutting the standard dimension panels.

**Cutting tolerances**

| | Metric | Imperial |
|---|---|---|
| Length and width | ± 2 mm/m<br>max. 5 mm | ± 0.08”<br>max. 0.2” |
| Squareness | 2 mm/m | 0.20 % |
| Edge straightness | 1.5 mm/m | 0.15% |

## 4.2 Fasteners

The panels can be fixed by screws or rivets according to the type of support structure: galvanized steel or wood.

Figures 4.2 and 4.3 show the screws and rivets that can be used to fix Valchromat panels on ceilings.

## 4.3 Support structure

The support structure may be metallic or wooden.

**Galvanized steel structure**

A type of structure widely used to support ceiling panels is made from C-shaped sections, which are suspended by means of threaded rods anchored to the ceiling. The connection between the threaded rods and the suspension sections is made with 1 mm (0.04”) thick galvanized steel T-47 pivots, the same as those used in the structures of plasterboard false ceilings, see figures 4.4, 4.5 and 4.6.

If ceiling sections of the plasterboard system are used, the type of screw used must be suitable for the structure.

The elements of the structure should always be oriented perpendicularly to the largest dimension of the panel, with equidistant spacing. The maximum distance between the support elements is 600mm (24”).

Other types of sections may be used as long as the necessary resistance and safety are guaranteed.

**Wooden structure**

The wood that constitutes the support structure must have at least class C18 resistance according to the EN 338 standard.

The cross-section of the uprights is generally rectangular, the minimum size being 40x50 mm (1 1/2”x2”), see figure 4.7.

## 4.4 Joints between panels

The joints between panels should have a minimum opening of 1 mm (0.04”), see figure 4.8.

## 4.5 Panel edges

The edges of the panels can be machined-worked into the form of a bevel, see figure 4.9.

## 4.6 Surface finishing

In order to protect the surfaces and to facilitate the maintenance cleaning, it is recommended that the Valchromat panel is varnished with a varnish suitable for wood particularly in moist areas.

The rear surface of the panel should be sealed with the primer (to seal the pores), the visible surface and the tops should be varnished with the number of coats necessary, as indicated by the manufacturer.

## FIGURES

### Mechanical features

| Feature | Unit | 8 | 12 | 16 | 19 | 30 | Standard |
|---|---|---|---|---|---|---|---|
| Density | $Kg/m^3$ | 850 | 820 | 800 | 790 | 740 | EN 323 |
| Swelling in thickness 24 hours | % | 12 | 10 | 8 | 8 | 7 | EN 317 |
| Internal bond | $N/mm^2$ | 0.80 | 0.80 | 0.75 | 0.75 | 0.75 | EN 319 |
| Bending strength | $N/mm^2$ | 42 | 40 | 38 | 38 | 36 | EN 310 |
| Modulus of elasticity in bending | $N/mm^2$ | 3400 | 3200 | 3100 | 3100 | 3000 | EN 310 |
| Swelling in thickness after cyclic testing | % | 19 | 16 | 15 | 15 | 15 | EN 317+EN 321 |
| Internal bond after cyclic testing | $N/mm^2$ | 0.30 | 0.25 | 0.20 | 0.20 | 0.15 | EN 319+EN 321 |

Table 1 - Panel Features

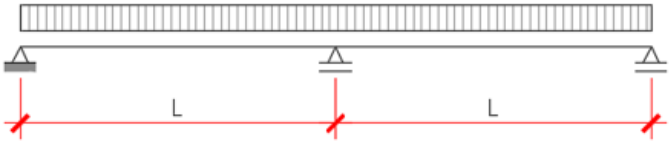
| Application | Thicknesses (mm) | | | | |
|---|---|---|---|---|---|
| | 8 | 12 | 16 | 19 | 30 |
| Walls and wall coverings | • | • | | | |
| Floor covering (continuous support) | | • | • | | |
| Flooring supported on beams | | | | • | • |
| Ceilings | • | • | | | |
| Decorative furniture and panels | • | • | • | • | • |

Table 2 - Summary of applications by thickness

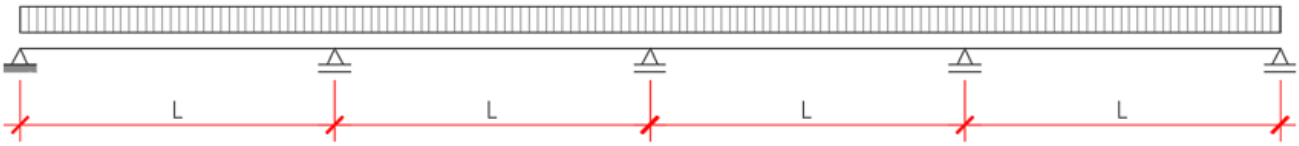
## Uniform Load Chart

2 Supports


3 Supports




Multiple Supports (> 3 Supports)




| Thickness | L | 2 or 3 Supports | | | | Multiple Supports | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Max Load. | | L/250 | | Max Load. | | L/250 | |
| (mm) | (m) | kN/m2 | psf | kN/m2 | psf | kN/m2 | psf | kN/m2 | psf |
| 16 | 0.3 | 37.8 | 789 | 11.9 | 249 | 47.3 | 987 | 28.8 | 602 |
| | 0.4 | 21.2 | 443 | 5.0 | 103 | 26.5 | 554 | 12.1 | 252 |
| | 0.5 | 13.5 | 282 | 2.5 | 52 | 16.9 | 354 | 6.1 | 128 |
| | 0.6 | 9.4 | 195 | 1.4 | 29 | 11.7 | 245 | 3.5 | 73 |
| 19 | 0.3 | 53.3 | 1114 | 20.0 | 418 | 66.7 | 1393 | 48.3 | 1009 |
| | 0.4 | 29.9 | 625 | 8.4 | 174 | 37.5 | 782 | 20.3 | 424 |
| | 0.5 | 19.1 | 399 | 4.2 | 88 | 23.9 | 500 | 10.3 | 216 |
| | 0.6 | 13.2 | 276 | 2.4 | 49 | 16.6 | 346 | 5.9 | 123 |
| 30 | 0.3 | 126.1 | 2634 | 76.6 | 1599 | 157.7 | 3293 | 157.7 | 3293 |
| | 0.4 | 70.8 | 1479 | 32.2 | 672 | 88.6 | 1850 | 77.7 | 1622 |
| | 0.5 | 45.3 | 945 | 16.4 | 342 | 56.6 | 1183 | 39.7 | 828 |
| | 0.6 | 31.4 | 655 | 9.4 | 196 | 39.3 | 820 | 22.9 | 477 |

Table 3- Uniform Load Chart

**FIGURES**

**Storage**

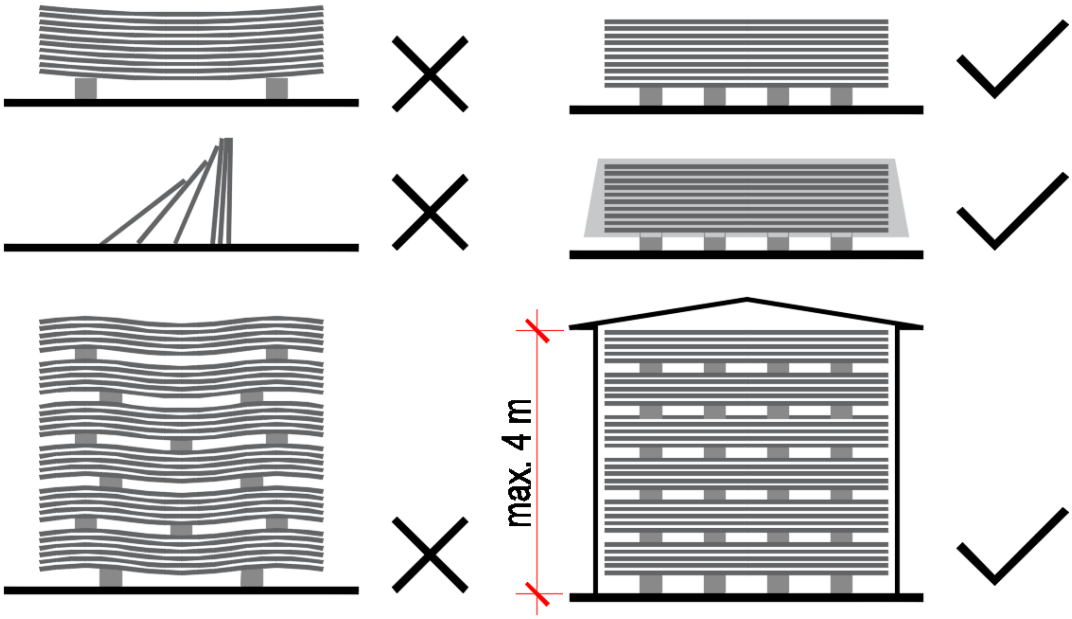



Figure 1.1 - Storage of Valchromat panels

**Handling**

Figure 1.2 - Handling of Valchromat panels

**Acclimatisation**

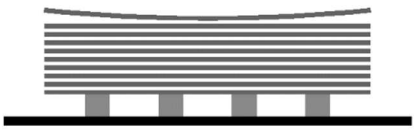


Figure 1.3 - Upper panel warp

**Machines for cutting, drilling and machining the Valchromat panel**

Figure 1.4 - Circular saw with tungsten cutting disc

Figure 1.5 – Hammer drill and 3-pointed HSS drills (for wood)

Figure 1.6 - Electric router and edge milling cutters

Figure 1.7 - Orbital sander and sanding disc

**Machining of edges**

Figure 1.8 – Edge machining. Bevel, rounding and milling.


Figure 2.1 - Panel gluing system

(SikaTack Panel produced by Sika and Simson PanelTack produced by Bostik)

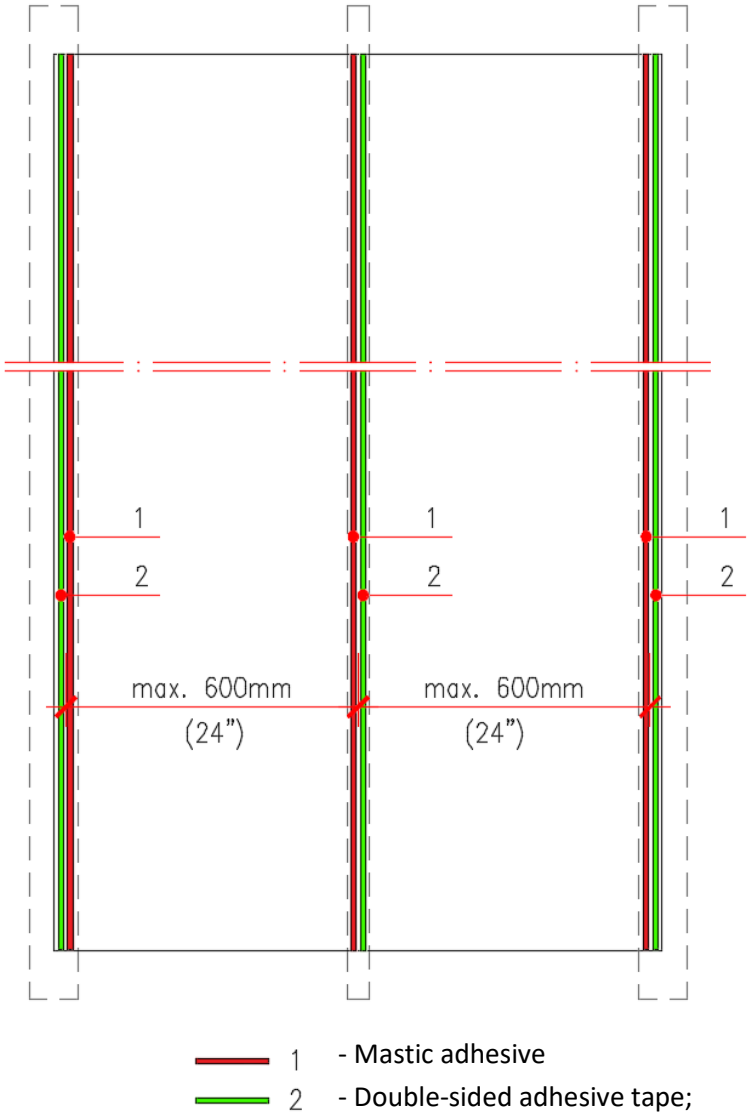



Figure 2.2 - Gluing system location

Figure 2.3 - Screw for wooden structure

Figure 2.4 - Screw for metal structure

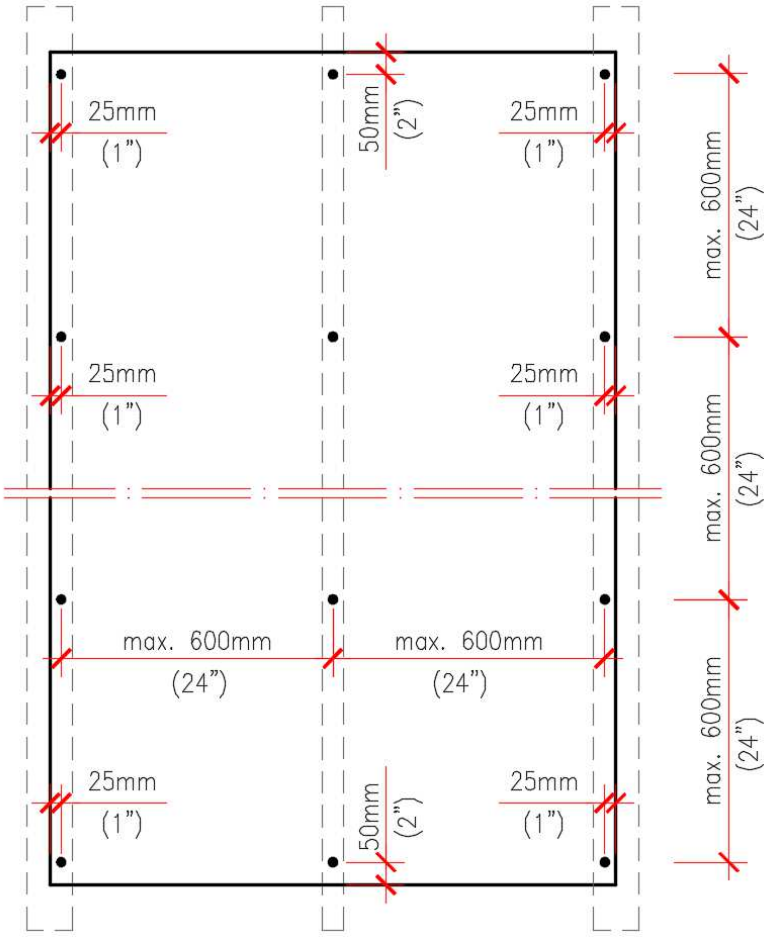



Figure 2.5 - Screws/rivets location

(Distances to the edges and between elements)

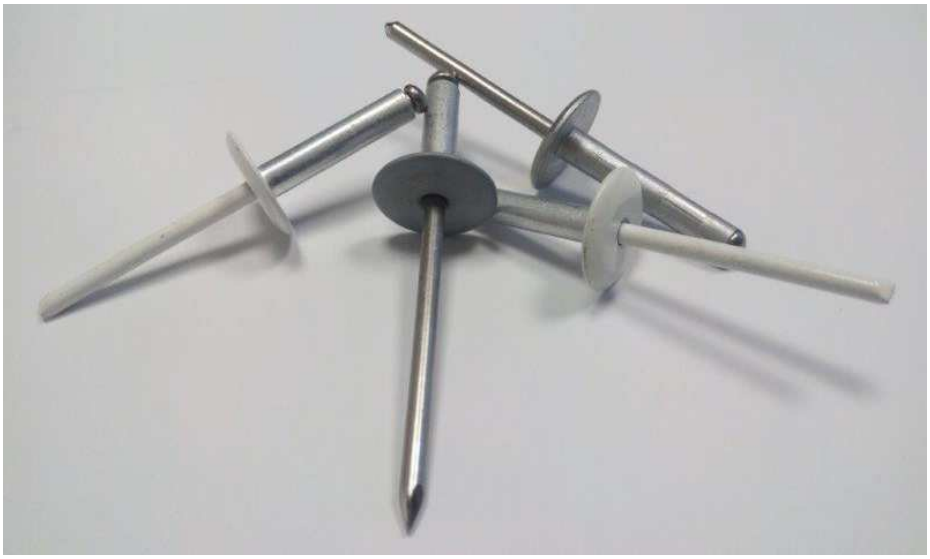


Figure 2.6 - Rivets

Figure 2.7 - Headless nail

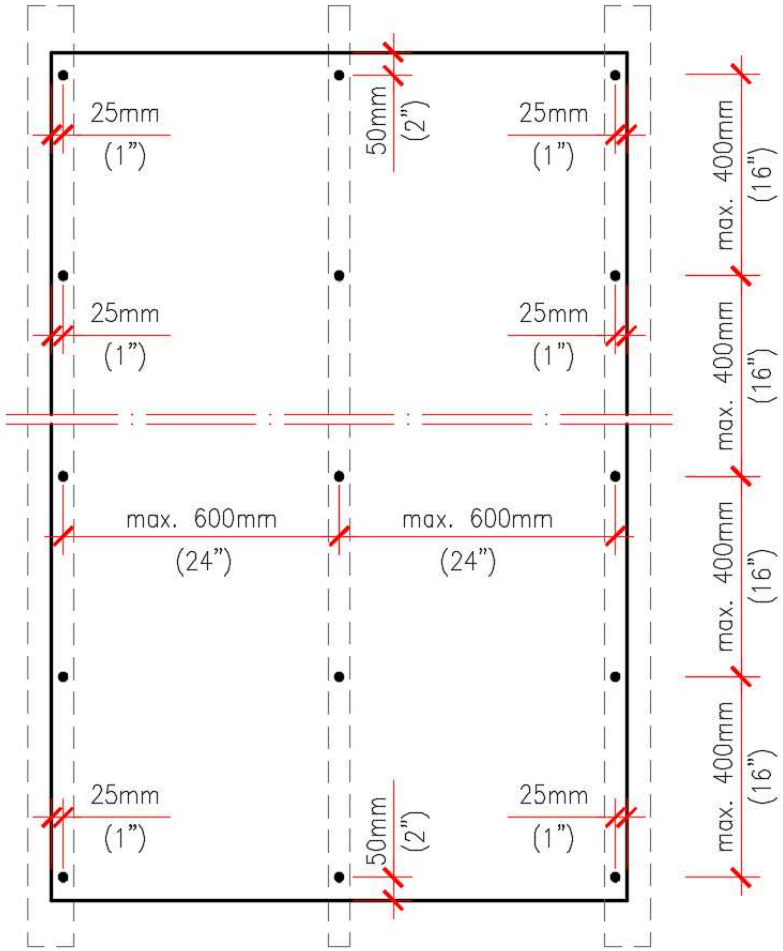



Figure 2.8 - Nail location

(Distances to the edges and between elements)

Figure 2.9 - Pneumatic nail gun

Figure 2.10 - 3M VHB double-sided adhesive tape


Figure 2.11 - 3M Dual-Lock Tape

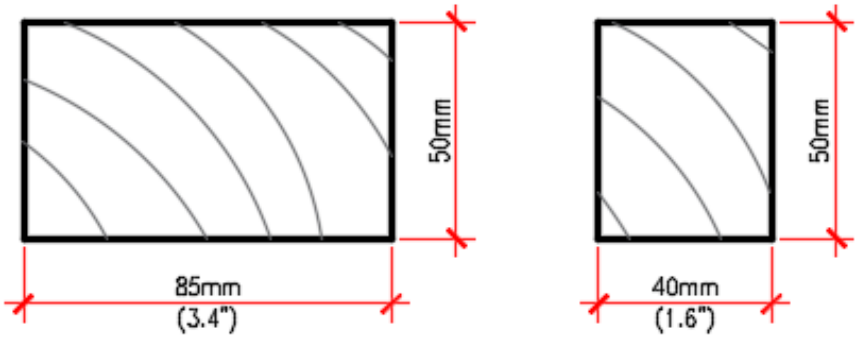



Figure 2.12 - Section type of wooden structure
(Class C18 Resistance)

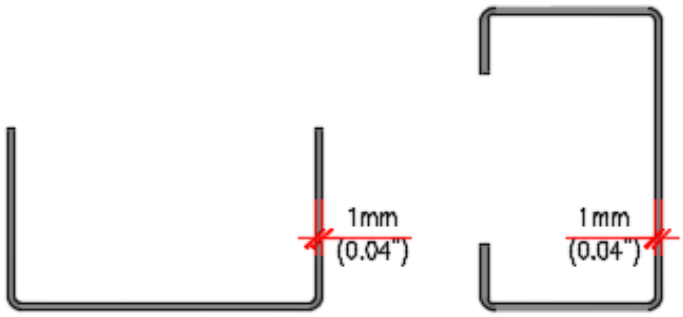



Figure 2.13 - Section type of structure in galvanized steel (Channel)
(Galvanized steel DX51D Z+)

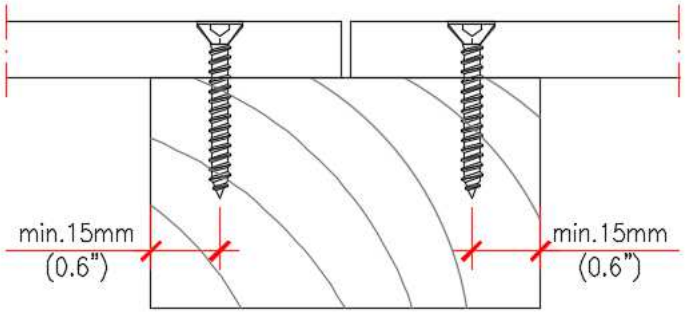



Figure 2.14 -Minimum distance between the screw and the edge of the wooden beam

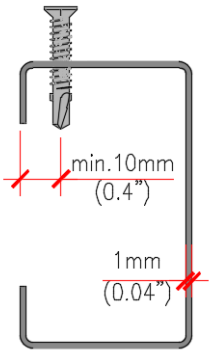



Figure 2.15 -Minimum distance between the screw and the edge of the metal section

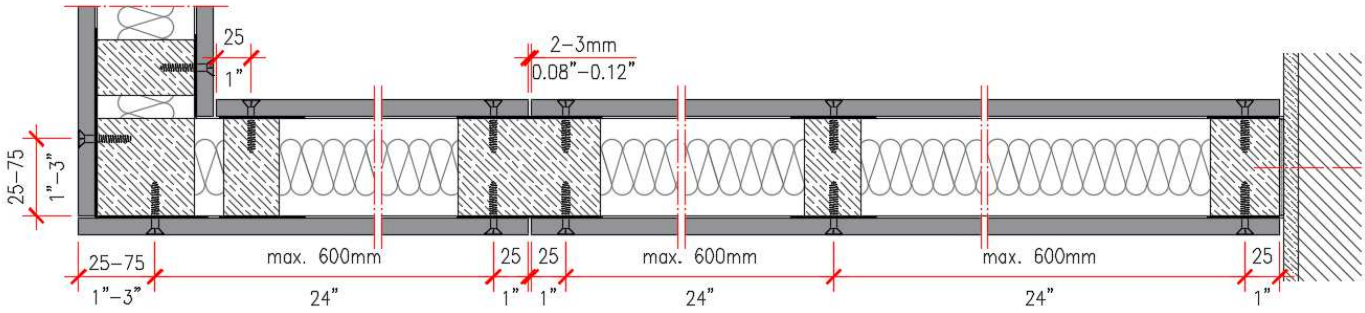



Figure 2.16 - Horizontal section of the wall, wooden structure

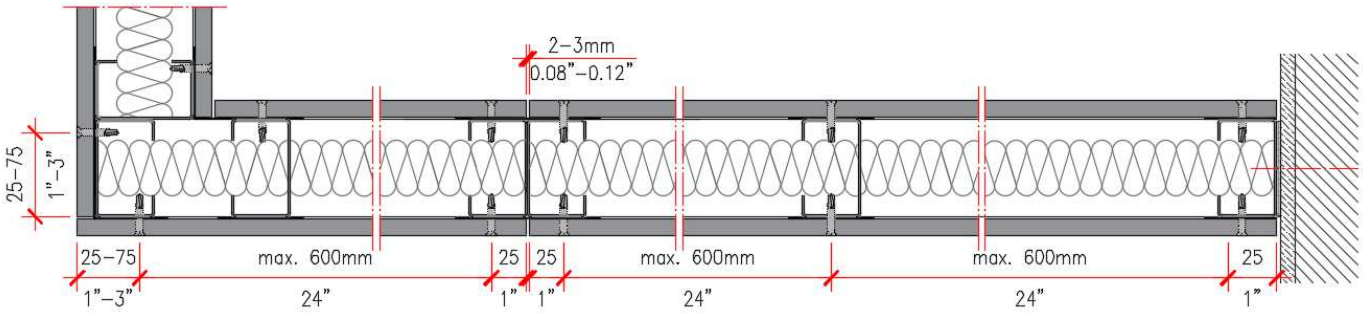



Figure 2.17 - Horizontal section of the wall, galvanized steel structure

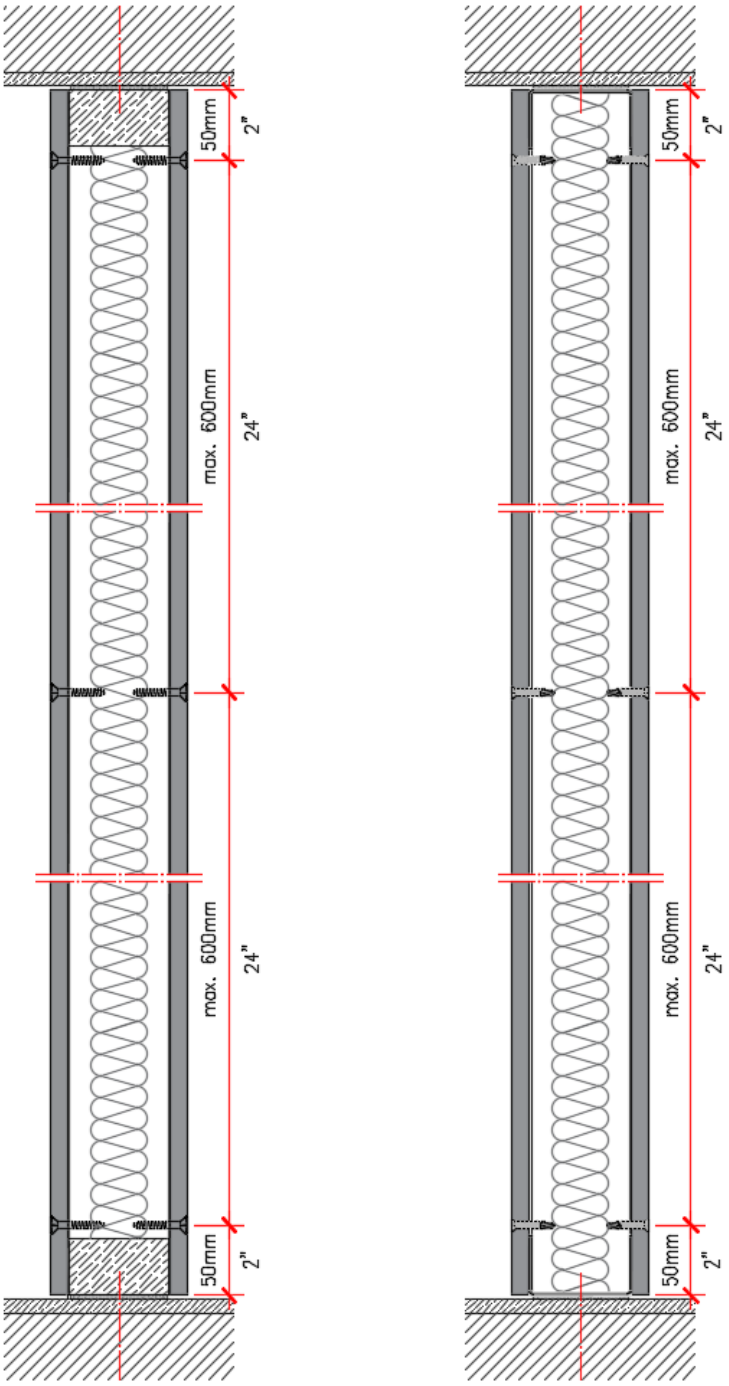



Figure 2.18 - Vertical section of the wall

Structure, wood and galvanized steel

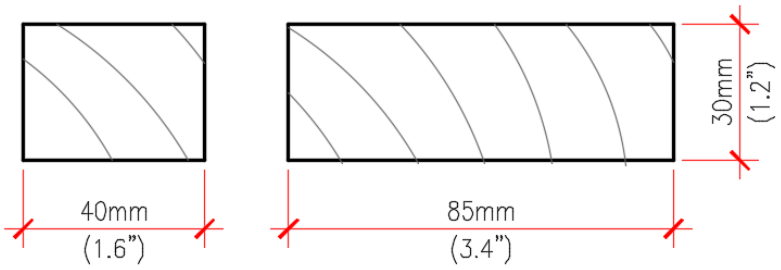



Figure 2.19 - Section type of wooden structure
(Class C18 Resistance)

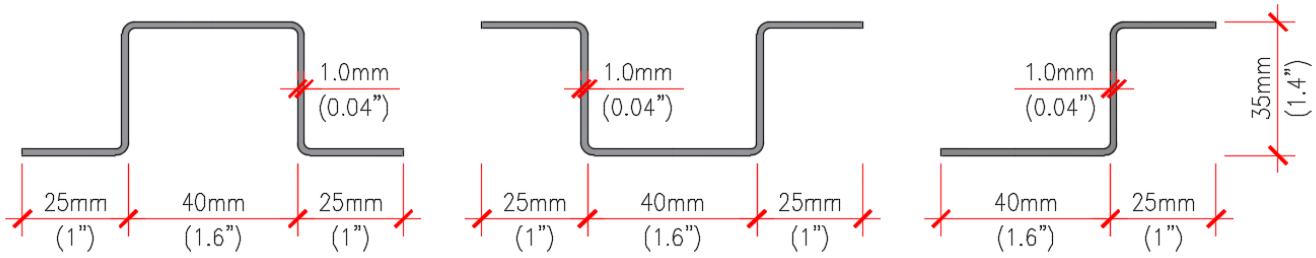



Figure 2.20 - Section type of structure in galvanized steel DX51D (Z+)
(Dx51D Z+ galvanized steel)

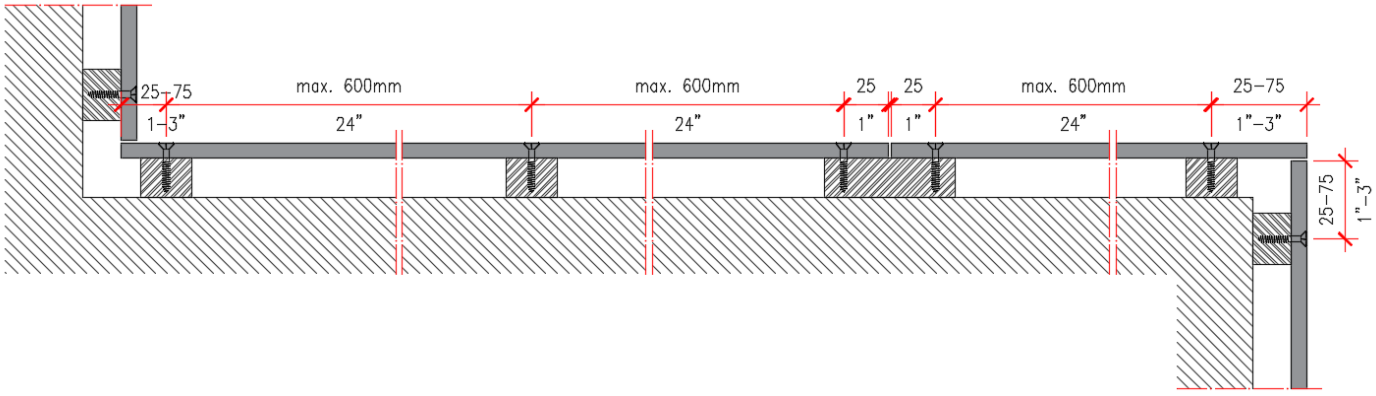



Figure 2.21 - Horizontal section, wooden structure

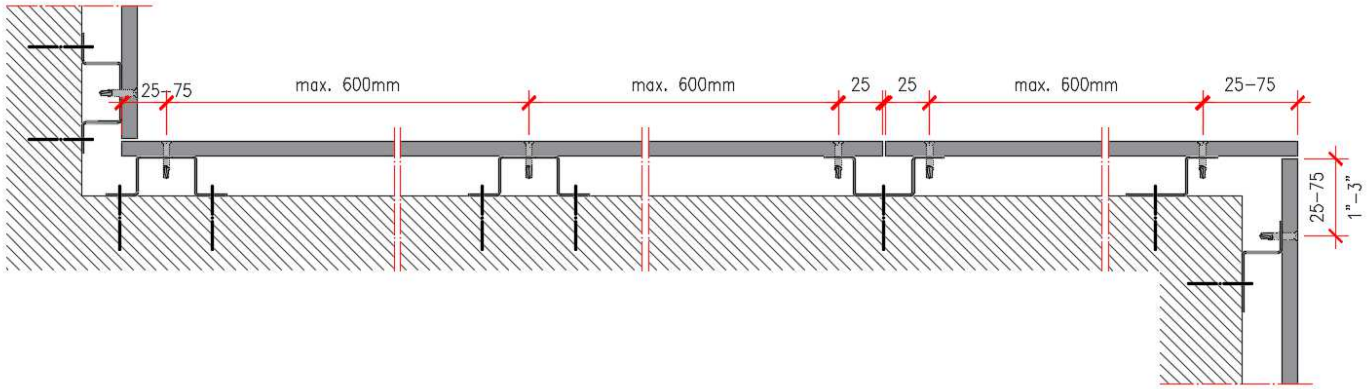



Figure 2.22 - Horizontal section, galvanized steel structure

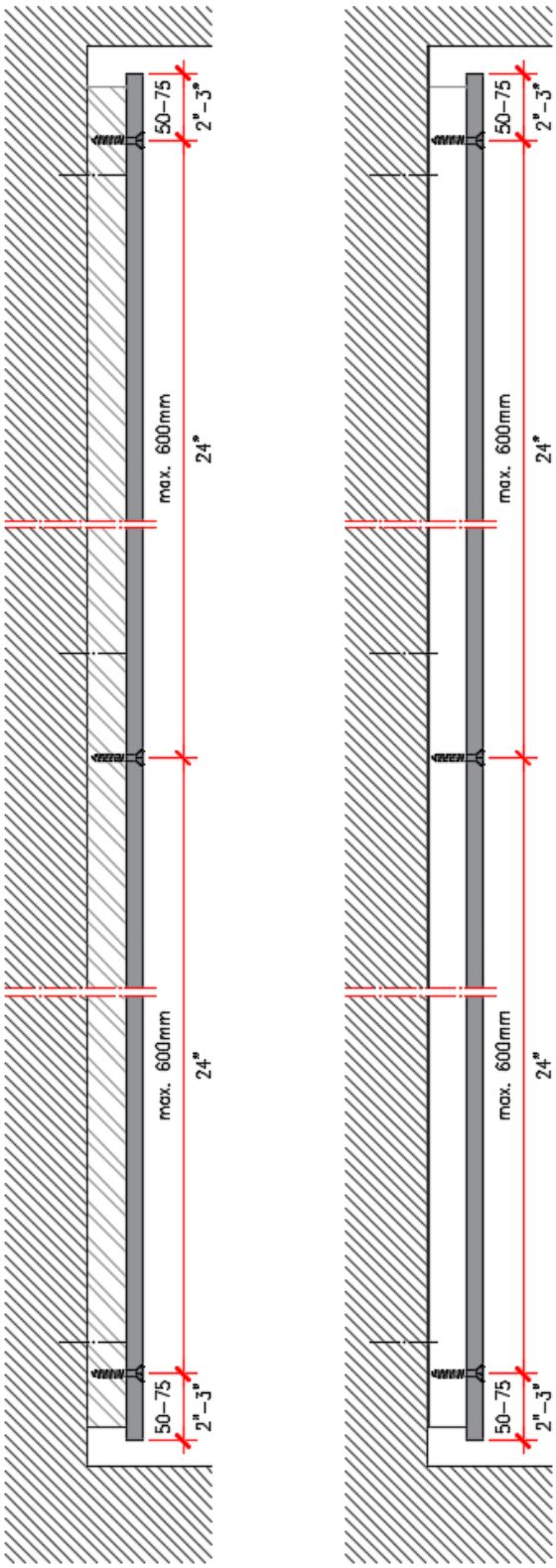



Figure 2.23 - Vertical section

Wooden structure and galvanized steel

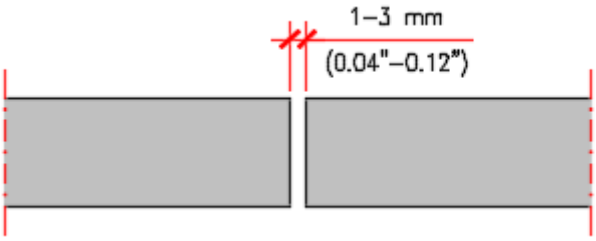



Figure 2.24 - Joints between panels

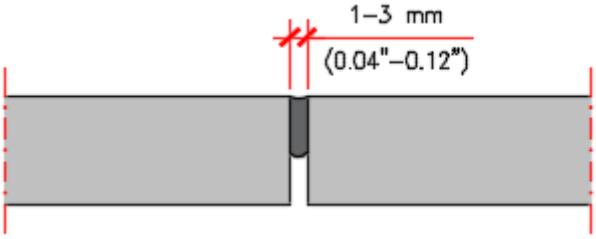



Figure 2.25 - Joints between panels with mastic filler

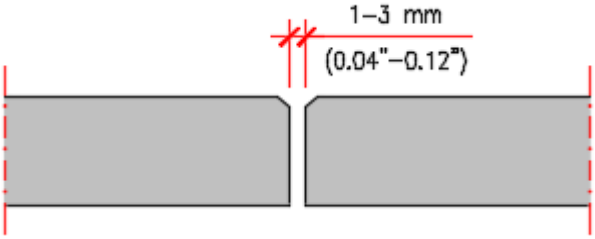



Figure 2.26 – Bevelled edge

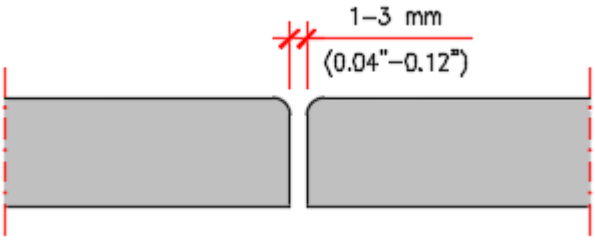



Figure 2.27 – Rounded Edge

## Floors

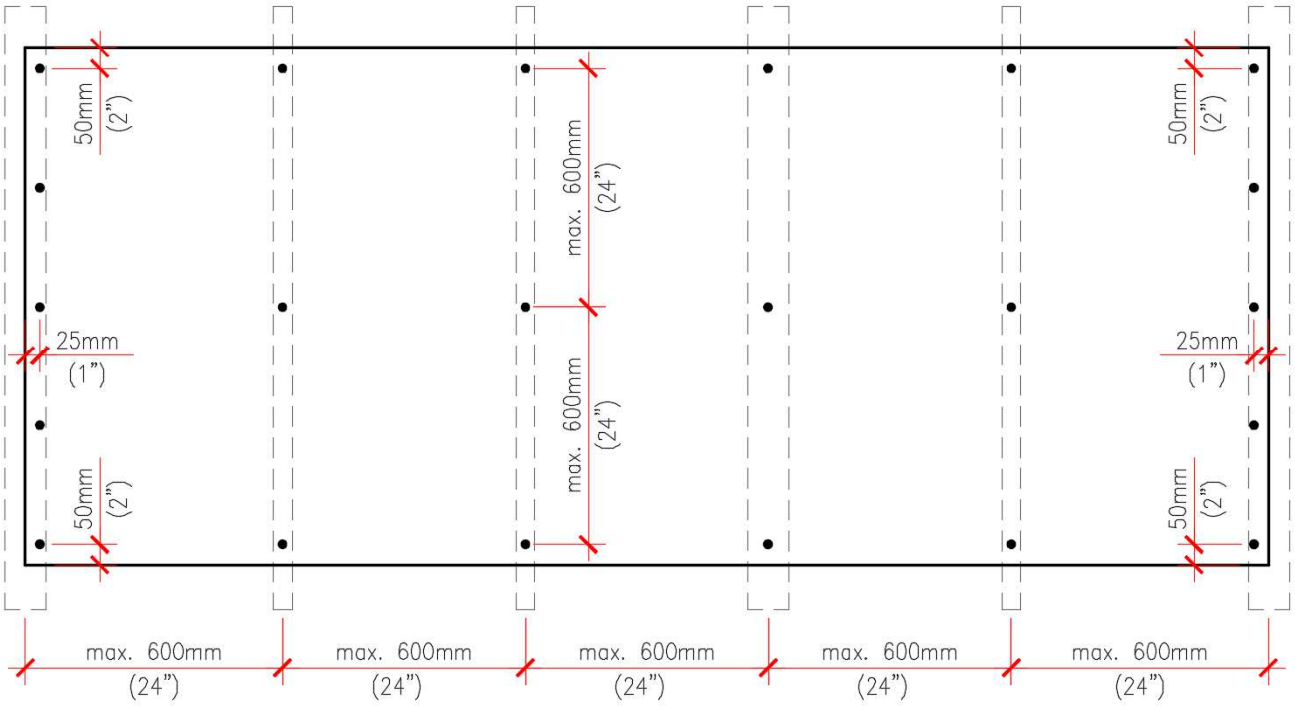



Figure 3.1 - Fixings location

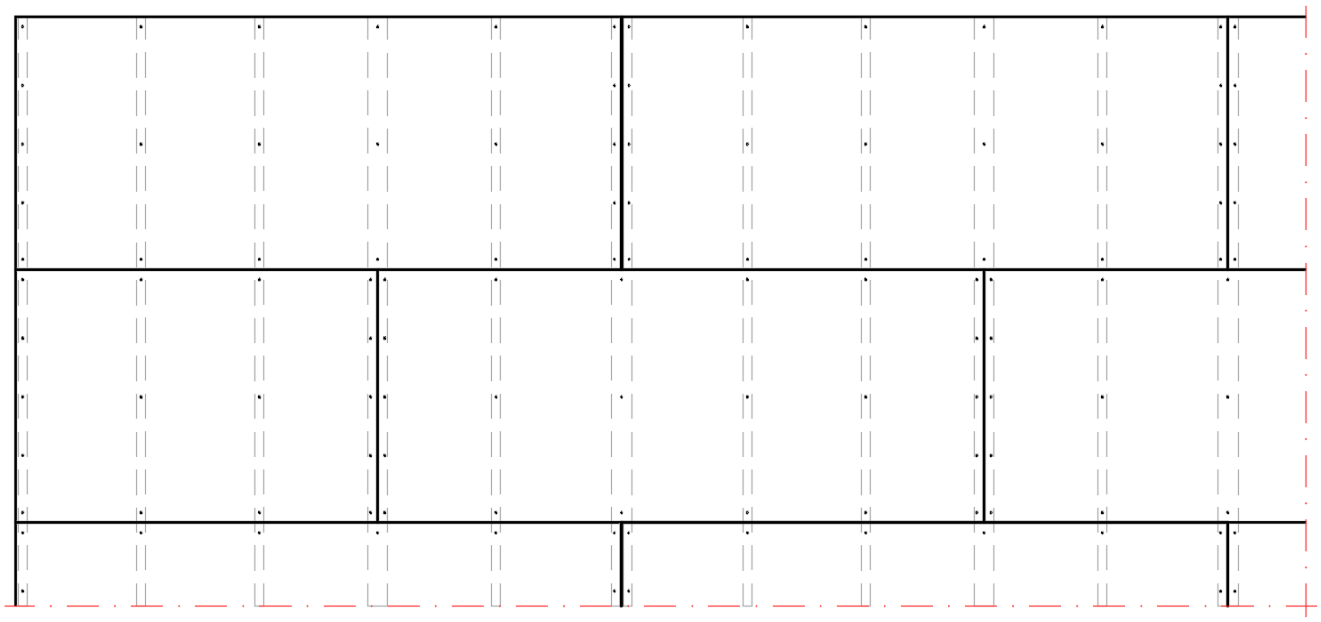


Figure 3.2 - Overview of a beam-supported floor

Figure 3.3 - Galvanized steel screw for wooden structure

Figure 3.4 - Galvanized steel screw for wooden structure

Figure 3.5 - Headless nail

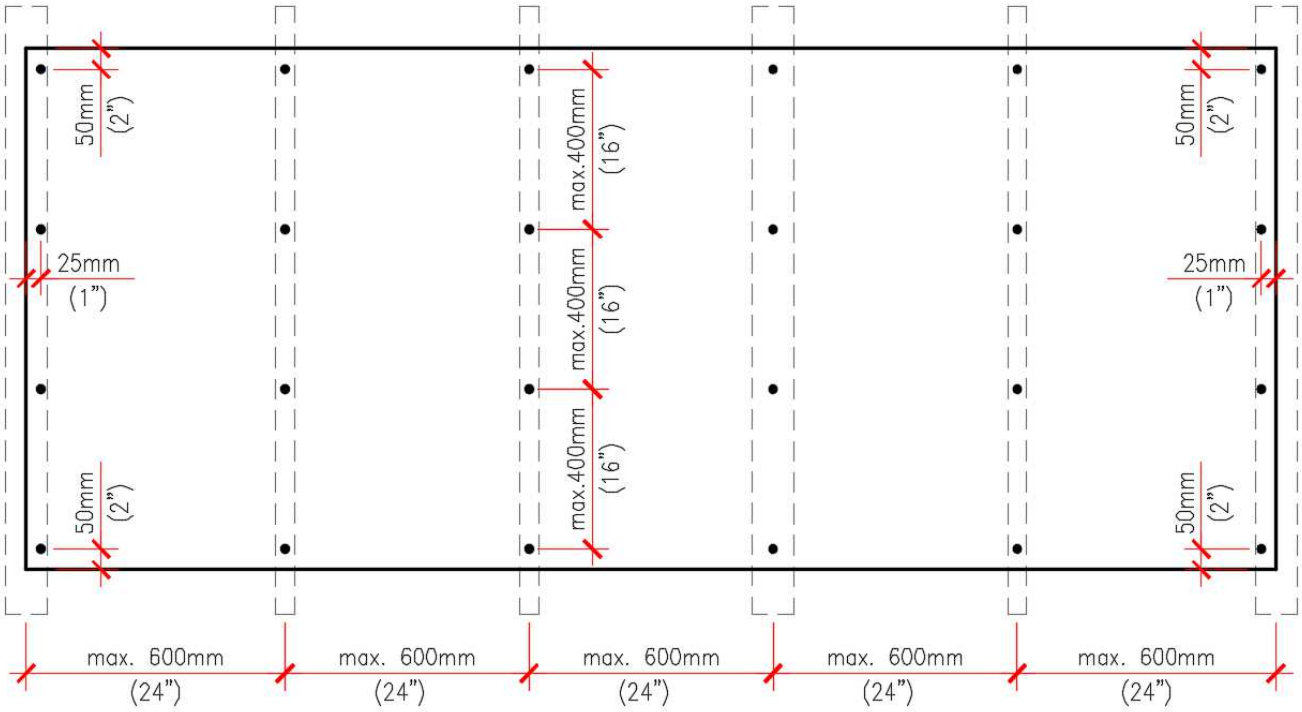



Figure 3.6 - Nails location

Figure 3.7 - Pneumatic nail gun


Figure 3.8 - Panel gluing system

(SikaTack Panel produced by Sika and Simson PanelTack produced by Bostik)

**Example of a floor design**

Floor design of a house made of 19 mm thick Valchromat panels 2.440 m in length, with supports every 600 mm.

**Actions**

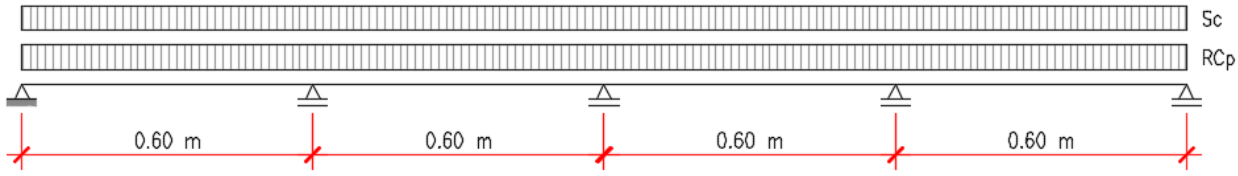
Permanent Loads

| | | |
|---|---|---|
| Self load weight (Pp) | 0.019x7,90 | 0.15 kN/m$^2$ |
| Remaining permanent loads (RCp) | | 2.00 kN/m$^2$ |

Overloads

| | |
|---|---|
| Housing (Sc) | 2.00 kN/m$^2$ |
| Concentrated load (knife load) | 1.50 kN/m |

**Uniformly Distributed Loads**




**Desing of Ultimate Limit States**

Combining actions with overload as base variable action
$S_{sd}$ = 1.35 Pp + 1.50 RCp + 1.50 Sc

$k_{mod}$ = 0.60 Medium-term shares
$f_{m.k}$ = 38 MPa

Maximum Forces
$M_{Sd,máx} = p.L^2/8$ = 0.19 kNm/m
$M_{Rd} = k_{mod}.w.f_{m.k} / \gamma_M$ = 0.60 x (19/1000)$^2$ / 6 x 38000 / 1.3 = 1.06 kN/m > 0.19 kNm/m

**Design of Limit Deformation States**

Near-permanent combination of stocks
Long-term deformation

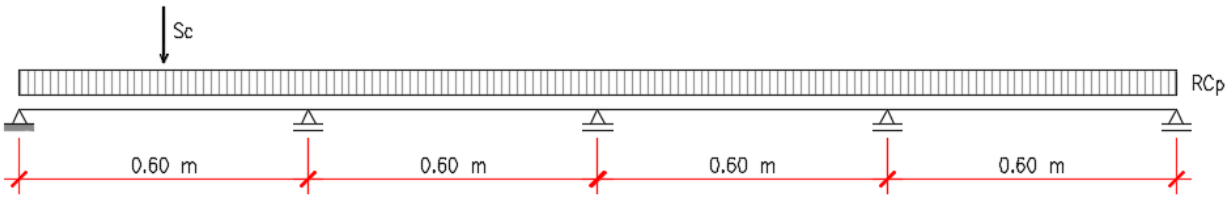
$\delta_{inst}$ = 1.0 $\delta_{Pp}$ + 1.0 $\delta_{RCp}$ + $\psi_2$ $\delta_{Sc}$ ; ($\psi_2$ = 0.2)
$\delta_\infty = \delta_{inst}$ x ( 1 + $k_{Def}$)

Maximum deformation L/250, 600/250 = 2.4 mm
Maximum instantaneous deformation $\delta_{inst} \approx 2.55.p.L^4/(384.E.I)$ = 0.6 mm

Long-term deformation, $\delta_{fin} = \delta$ inst x ( 1 + 2.25) = 1.9 mm < 2.4 mm

Figure 3.9 - Design example, uniform loads

**Concentrated Overload (Knife Load)**




**Desing of Ultimate Limit States**

Combining actions with overload as base variable action
$S_{sd}$ = 1.35 Pp + 1.5 RCp + 1.5 Sc

$k_{mod}$ = 0.85 - Short-lived actions

Maximum Forces
$M_{Sd,máx}$ = 0.37 kNm/m
$M_{Rd} = k_{mod}.w.f_{m.k} / \gamma_M$ = 0.85 x $(25/1000)^2$ / 6 . 38000 / 1.3 = 2.59 kN/m > 0.37 kNm/m

**Design of Limit Deformation States**

Characteristic combination of actions
Instant deformation
$\delta_{inst} = 1.0\ \delta_{Pp} + 1.0\ \delta_{RCp} + \psi_0\ \delta_{Sc}$ ; ($\psi_0$ = 0.4)

Maximum deformation L/250, 600/250 = 2.4 mm
Instant maximum deformation $\delta$ inst ≈ 0.7 mm < 2.4 mm

Figure 3.10 – Design example, concentrated knife load

Figure 3.11 – Notched trowel to spread polyurethane mortar

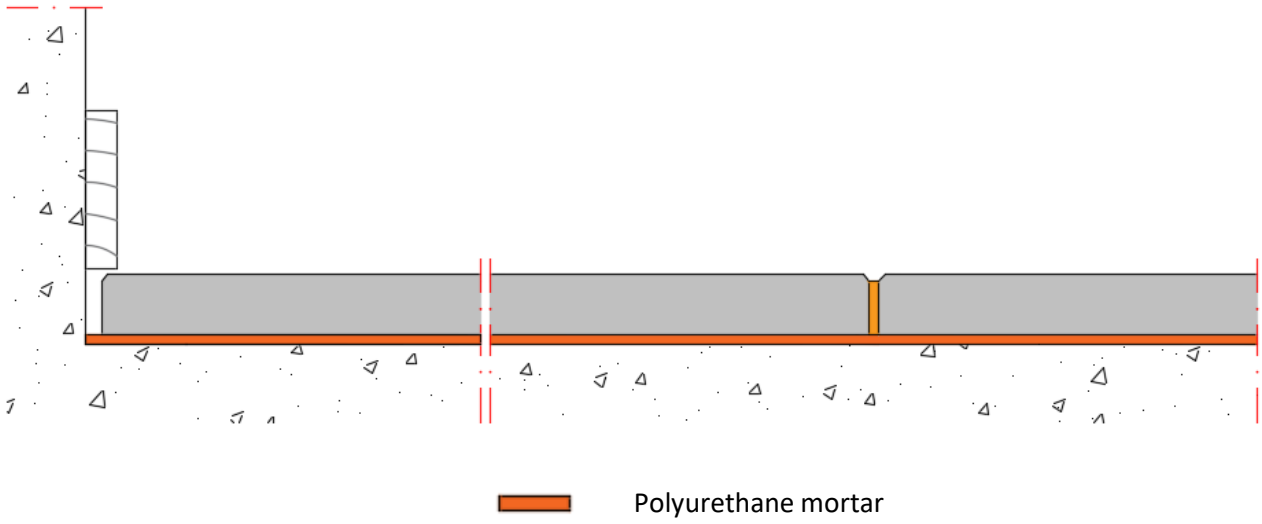



Figure 3.12 - Longitudinal section

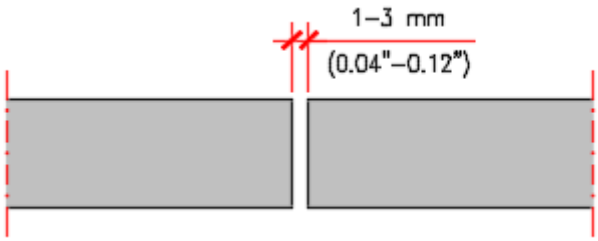



Figure 3.13 - Joints between panels

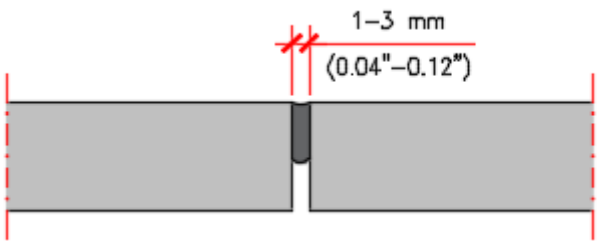



Figure 3.14 - Joints between panels with mastic

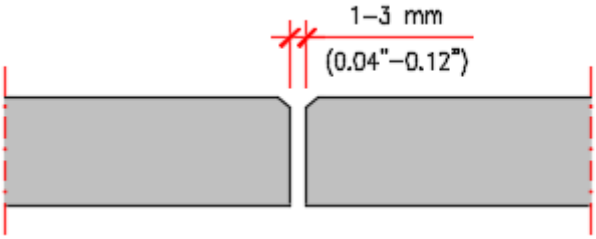



Figure 3.15 - Bevelled edge

**False ceilings**

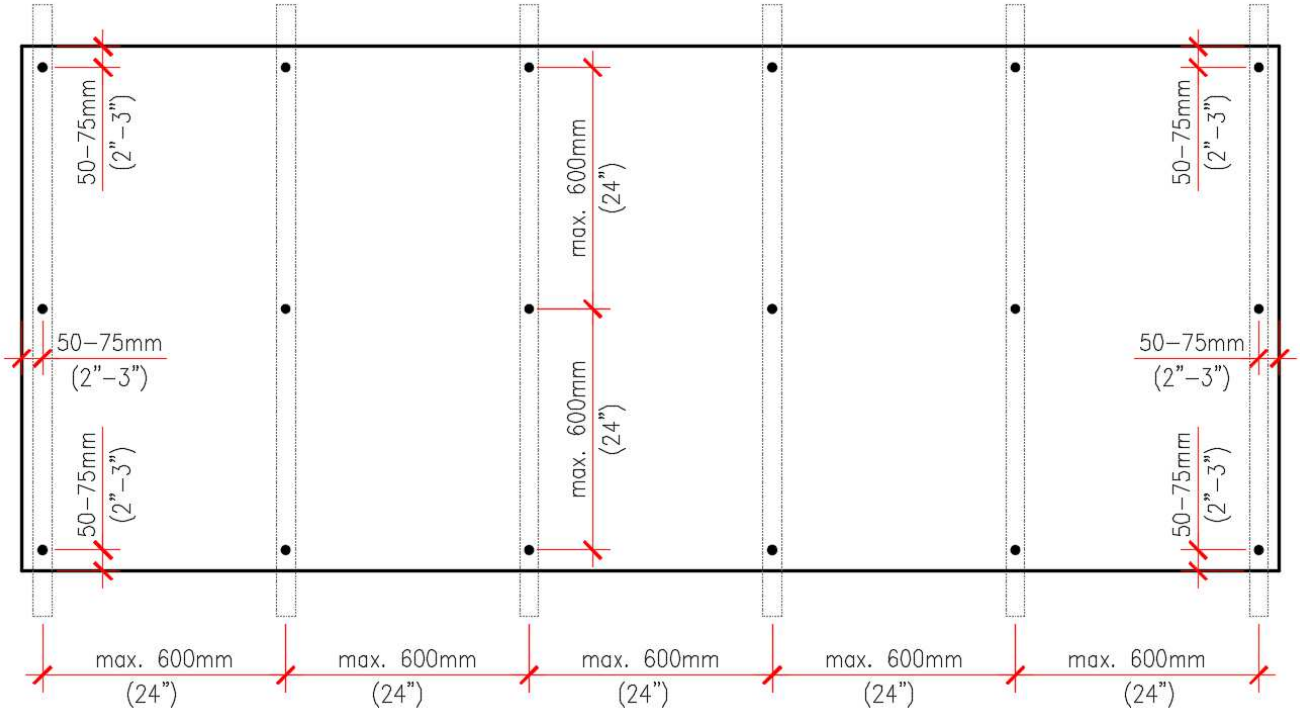



Figure 4.1 – Fixings location

Figure 4.2 - Screws and rivets for metallic structure

Figure 4.3 - Screws for wooden structure

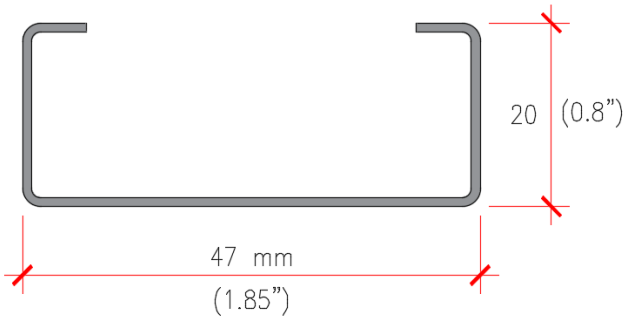



Figure 4.4 - C profile, galvanized steel Dx51D (Z+)

Figure 4.5 - Pivot

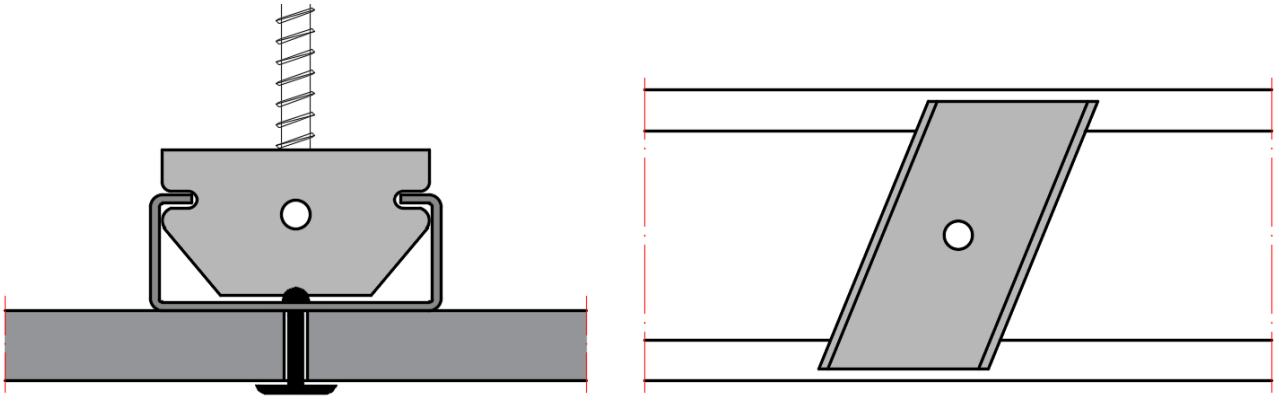


Figure 4.6 - Panel attachment detail to the support section

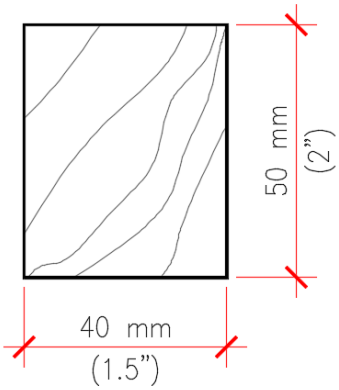



Figure 4.7 - Wood profiles

Minimum resistance class C18 (EN 338)

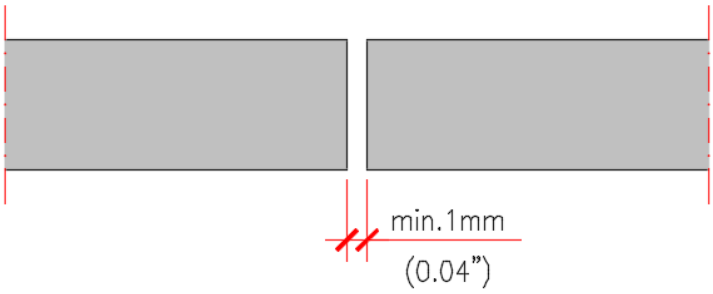



Figure 4.8 - Joint between panels

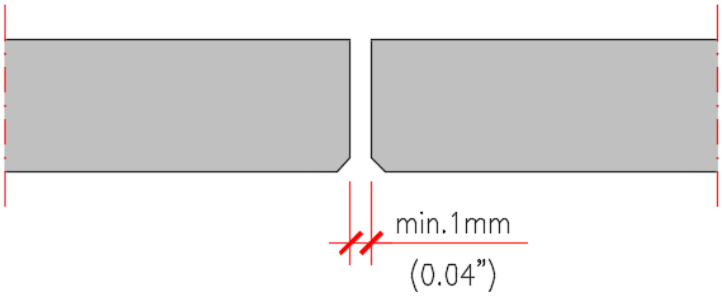



Figure 4.9 – Bevelled edge