



Technical File

Chapter 1 - Introduction

Cement-bonded particleboards

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INDEX

1.	INTRODUCTION	5
1.1	Description	5
1.2	Materials used in manufacturing.....	5
1.3	Dimensions	5
1.4	Cutting tolerances	5
1.5	Colours	6
1.6	Thicknesses and thickness tolerances	9
1.7	Mechanical features.....	9
1.8	Other features	10
1.9	Sound isolation	10
1.10	Weight.....	11
1.11	Packaging	11
1.12	Quality control in production.....	11
1.13	Pallet labelling	12
1.14	Varnishing and painting	13
1.15	Cutting	13
1.16	Drilling.....	14
1.17	Edge machining	14
1.18	Surface polishing.....	15
1.19	Sanded surfaces.....	15
1.20	Storage.....	16
1.21	Handling	16
1.22	Acclimatisation.....	17
1.23	Application	17
1.24	Colour variation	17
1.25	Maintenance	18
1.26	Technical support.....	18
1.27	Declaration of Performance (DoP).....	18

INDEX OF TABLES AND FIGURES

Figure 1.1 - Viroc Grey	6
Figure 1.2 - Black Viroc.....	6
Figure 1.3 - White Viroc	7
Figure 1.4 - Yellow Viroc	7
Figure 1.5 - Red Viroc	8
Figure 1.6 – Ochre Viroc.....	8
Figure 1.7 - Circular saw with tungsten cutting disc	14
Figure 1.8 - HSS drill and bits (for drilling metal)	14
Figure 1.9 - Electric edge milling cutters for machining edge process	14
Figure 1.10 - Bevel, groove and notch.	15
Figure 1.11 – Tongue and groove and half-lap.....	15
Figure 1.12 - Orbital sander and cleaning disk	15
Figure 1.13 - Storage of Viroc panels	16
Figure 1.14 - Viroc panels Handling.....	16
Figure 1.15 - Upper panel warping	17



TABLE.....	18
Summary of applications by thickness.....	18
Table 1 - Summary of applications by thickness	18

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This technical document invalidates all previous technical documents.

Issue: February 15, 2024

1. INTRODUCTION

1.1 Description

Viroc is a composite panel made from a mixture of cement and wood, known as the Cement Bonded Particle Board (CBPB). It combines the flexibility of wood with the strength and durability of cement, permitting a wide range of applications, both indoors and outdoors. The production of the Viroc panel complies with the specifications of the EN634 and EN13986 Standards and has a CE Marking Certificate.

The Viroc panel has a heterogeneous appearance with different shades dispersed randomly, which are the result of the natural colours of the raw materials used and the chemical reactions.

The surfaces may show some irregularities, such as small incrustations, dirt, stains, scratches, salts (efflorescence) and small wood chips.

Whenever the panel is to be exposed, even if a varnish finish is not foreseen, the surface that will be visible must be cleaned/polished with a cleaning disk to remove any imperfections.

Differences in tone may be observed on the same face, between the faces of the same panel or between the different productions.

The surfaces of the panels, if required, can be supplied polished. Polishing consists of cleaning the surface of salts, dust and some dirt derived from the manufacturing process, without altering the panel natural appearance. The panel will continue to retain its characteristic stains and colour heterogeneities.

If required, the panels can be supplied sanded. This operation consists of roughening the surfaces with coarse sandpaper in order to minimise the variation in thickness. Once sanded, the surfaces are left with visible wood particles. The sanded panel has no decorative features, so it can be seen.

The Viroc panel only has one side to show. When packaged, this is the side that faces upwards.

The Viroc panel is regarding fire reaction of class B-s1,d0 rating.

The Viroc A2 panel is regarding Fire reaction of class A2-s1,d0 rating.

1.2 Materials used in manufacturing

Percentage by dry weight:

Portland cement: 61,8%

Pine wood chips: 22,7%

Water: 10,7%

Non-toxic additives: 1,4%

Pigment: 3,4%

1.3 Dimensions

Manufacturing dimensions:

2600x1250 mm and 3000x1250 mm

1.4 Cutting tolerances

Length and width: ± 3 mm

Squarness: ≤ 2.0 mm/m

Edge straightness: ≤ 1.5 mm/m

1.5 Colours

The Viroc panel comes in 6 different colours. The colour of the panels results from the addition of a pigment to the mass during the manufacturing process. The Viroc panel has a heterogeneous appearance with different shades dispersed randomly, which are the result of the natural colours of the raw materials used and chemical reactions, see photographs 1.1 to 1.6.

For availability of colours and dimensions, see the Viroc panel data sheet.



Figure 1.1 - Viroc Grey



Figure 1.2 - Black Viroc



Figure 1.3 - White Viroc



Figure 1.4 - Yellow Viroc



Figure 1.5 - Red Viroc



Figure 1.6 – Ochre Viroc

1.6 Thicknesses and thickness tolerances

Raw and polished panel	
Thickness (mm)	Tolerance (mm)
8	± 0.7
10	± 0.7
12	± 1.0
16	± 1.2
19	± 1.5
22	± 1.5
25	± 1.5
28	± 1.5
32	± 1.5

1.7 Mechanical features

Features	Performance	Standard
Density Average value	≥ 1000 Kg/m ³ 1350 Kg/m ³	EN 323
Modulus of elasticity in bending: Class 2 Class 1 Average value	≥ 4000 N/mm ² ≥ 4500 N/mm ² 6000 N/mm ²	EN 310
Bending strength Average value	≥ 9 N/mm ² 12 N/mm ²	EN 310
Internal bond Average value	≥ 0.5 N/mm ² 0.8 N/mm ²	EN 319
Internal bond after cyclic testing	≥ 0.3 N/mm ²	EN 319 EN 321
Swelling 24h Average value	≤ 1.5% ≤ 0.8%	EN 317
Swelling after cyclic testing	≤ 1.5%	EN 317 EN 321

1.8 Other features

Reaction to Fire

Viroc: B-s1,d0 - Combustible but not flammable

Viroc: A2: A2-s1,d0 - Incombustible

Thermal conductivity

$\lambda = 0.22 \text{ W/(m.K)}$

Moisture

Outside at origin: 6 - 12%

Alkalinity

Surface alkalinity PH: 11 - 13

Formaldehyde

Class of formaldehyde: E1 (EN 13986-Annex B)

No formaldehyde added (NAF)

Amiante/Asbestos

Does not contain.

Pentachlorophenol

Does not contain.

Microcrystalline silica

Does not contain.

1.9 Sound isolation

Sound reduction index R_w (C;Ctr)

Thickness (mm)	R_w (C;Ctr) (dB)
8	31 (-1;-3)
10	32 (-2;-3)
12	33 (-1;-3)
16	35 (-2;-3)
19	35 (-1;-2)
22	37 (-2;-3)

1.10 Weight

Specific weight: Average value 1350 Kg/m³

Thickness (mm)	Weight per m ² (Kg/m ²)	Weight of panels	
		2600x1250 (Kg)	3000x1250 (Kg)
8	10.8	35.1	40.5
10	13.5	43.9	50.6
12	16.2	52.7	60.8
16	21.6	70.2	81.0
19	25.7	83.4	96.2
22	29.7	96.5	111.4
25	33.8	109.7	126.6
28	37.8	122.9	141.8
32	43.2	140.4	162.0

1.11 Packaging

Number of panels per pallet

Thickness (mm)	2600x1250 (mm)	3000x1250 (mm)
8	60	57
10	48	46
12	40	38
16	30	28
19	25	24
22	24	23
25	21	20
28	18	18
32	16	16

1.12 Quality control in production

VIROC Portugal is a company with a CE Marking Certificate, so all the tests are carried out in order to comply with the characteristics required by European standards (EN).

Any material that does not comply with the requirements is considered "Non-Conforming" and is not marketed with the CE Marking Certificate.

In raw materials

- Measuring the wood logs sugar residues, in all loads, until the value conforms;
- Moisture from shavings, once a day.

During manufacturing

- Wood chip granulometry, once a day;
- Density and quantity of chemicals, once every 8 hours or whenever the tank is filled;
- Moisture of the mixture, twice per hour;
- Mattress thickness, continuous measurement;
- Temperature and moisture in the hardening tunnel, continuous measurement;
- Temperature and moisture in the drying tunnel, continuous measurement;

In the final product

- Thickness, on all panels;
- Dimensions, once every 2 hours or whenever the thickness changes: Length and width ± 3 mm;
- Squareness, once every 2 hours or whenever the thickness changes: ≤ 2 mm/m;
- Edges straightness, once every 2 hours or whenever the thickness changes: ≤ 1.5 mm/m;
- Density, once every 8 hours or whenever the thickness or the colour changes: ≥ 1000 Kg/m³;
- Bending strength, once every 8 hours or whenever the thickness or the colour changes: ≥ 9 N/mm²;
- Modulus of Elasticity, once every 8 hours or whenever the thickness or the colour changes: of Class 2 ≥ 4000 N/mm², of Class 1 ≥ 4500 N/mm²;
- Internal bond, once a day or whenever the thickness or the colour changes: ≥ 0.5 N/mm²;
- Swelling 24h, once a day or whenever the thickness or the colour changes: ≤ 1.5 %;
- Internal bond after cyclic testing, once a week: ≥ 0.3 N/mm²;
- Swelling after cyclic testing, once a week: ≤ 1.5 %;
- Moisture in the panels after drying, once every 8 hours or whenever the thickness or the colour changes.

1.13 Pallet labelling

All pallets are labelled with the following information:

- Name and address of the manufacturer;
- Type of panel, Raw or Sanded;
- CE Marking logo with the certificate number;
- Thickness;
- Colour;
- Dimensions;
- Edging, normal cutting or tongue and groove/half-lap machining;
- Number of panels;
- Volume number.

1.14 Varnishing and painting

Viroc panels should be painted or varnished to improve their resistance to weather exposure. They can also be painted for decorative purposes. VIROC Portugal S.A. recommends sealing the panel with a varnish or paint, particularly when the panel is applied outdoors, in order to seal the pores and protect it from the effects of sun radiation, rain and temperature variations. Sealing the panel on all faces and edges increases durability and dimensional stability.

Panels that have not been painted/varnished are more likely to show drips and efflorescence stains. These efflorescences can be cleaned by mechanically polishing them with an abrasive cleaning disc. It is not always possible to completely remove these stains or drips.

Panels that are not painted or varnished have greater dimensional variation. Under extreme conditions, the shrinkage of the panel could be 0.5% (5 mm/m) and the panel could warp out of plane.

Before applying paint or varnish, the panel surfaces must be clean of dirt, dust, grease and efflorescence. The panels can be cleaned by polishing them with an abrasive cleaning disc, or alternatively with a paper sandpaper with a grit of 120 or more. Cleaning must be careful to avoid excessive sanding of the surface, which could remove the layer of the fines and expose the wood fibres, altering the appearance of the panel.

Paint or varnish must be applied to both sides and tops of the panels, applying the coats recommended by the manufacturer.

There are no specific paints or varnishes to be applied to Viroc. The panel has a surface alkalinity (PH) of 11 to 13, so paints and varnishes suitable for concrete and wood surfaces at the same time are usually the best when applied to Viroc panel.

Paints and varnishes made from acrylic resins or solvent-based aliphatic polyurethanes are the ones that have shown the best performance. Water-based acrylic resin or aliphatic polyurethane varnishes have the least effect on the panel original colour.

In addition to the above, paints and varnishes must be suitable for their intended purpose. For example, if it is a façade, the paint/varnish must be suitable for use on exterior walls, and if it is a floor, the paint/varnish must be hard and resistant enough for this application.

Generally speaking, varnishes are easy to apply, but it is very important to bear in mind that the application must be continuous and constant, to ensure that the finish is homogeneous on the panel and that the surface does not become stained and have different shades. The panels must always be painted/varnished on both sides and tops, and the application procedures, supplied by the respective manufacturers, must always be followed for the recommended coats.

1.15 Cutting

The panels can be cut, drilled and machined with electric or compressed air tools, normally used in carpentry or mechanical locksmith shops.

Cutting, drilling and machining Viroc panels releases dust that may contain traces of silica and cementitious material, so the appropriate individual protective equipment such as masks, gloves, goggles, etc. should be used.

Viroc panels should be cut using circular saws with high wear-resistant carbide (tungsten) or diamond cutters (see figure 1.7). To make multiple cuts or cut panels with a thickness of 19 mm or more, a horizontal cutting table should be used. The cutting table will make the cutting work more effective.

Frezite (www.frezite.pt) has saw blades suitable for cutting Viroc panels.

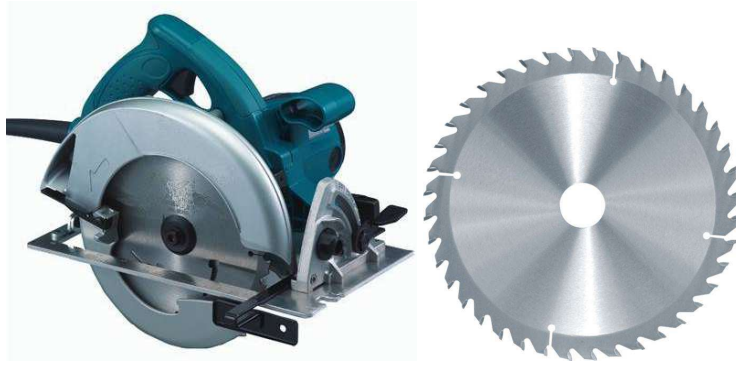


Figure 1.7 - Circular saw with tungsten cutting disc

1.16 Drilling

Drilling must be carried out with drills in "non-impact" mode using HSS (High Speed Steel) bits suitable for drilling metal (see figure 1.8).

Frezite (www.frezite.pt) has drill bits suitable for drilling Viroc panels.



Figure 1.8 - HSS drill and bits (for drilling metal)

1.17 Edge machining

Simple edge machining can be carried out on site using portable edge milling cutters (see figure 1.9).

Using the right cutters, you can make edges with: Bevelling, grooving, notching, etc. (see figure 1.10).

The edges of the panels can be supplied with factory-made notches, tongue-and-groove or half-lap (see figure 1.11).



Figure 1.9 - Electric edge milling cutters for machining edge process



Figure 1.10 - Bevel, groove and notch.

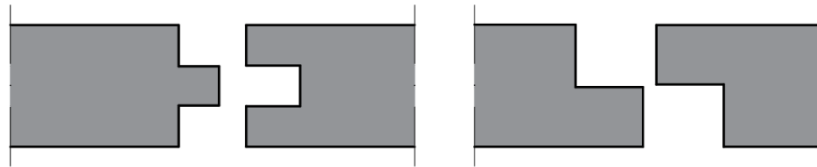


Figure 1.11 – Tongue and groove and half-lap

1.18 Surface polishing

Polishing consists of cleaning the surface of the salts, dust and some dirt derived from the manufacturing process, without altering the panel natural appearance. The panel will retain the stains and heterogeneities that characterise it.

When required, the Viroc panel can be supplied polished at the factory. However, this operation will be carried out on site.

On-site polishing is achieved with an orbital sander using abrasive cleaning discs (see figure 1.12).

The cleaning discs are made of an abrasive polypropylene fibre, Scotch Brite, which removes dirt without damaging the surface layer of the panel.

Alternatively, sandpaper discs with a grit of 120 or more can be used.

Care must be taken when cleaning with sandpaper to avoid removing the layer of the fines from the panel surface and exposing the wood fibres.



Figure 1.12 - Orbital sander and cleaning disk

Video illustrating the cleaning of a panel with an orbital sander:

<https://www.youtube.com/watch?v=HeQZNVNOZYI>

1.19 Sanded surfaces

On request, Viroc panels can be supplied sanded, such as the Viroc Floor panel. This operation consists of roughening the surfaces with coarse sandpaper in order to minimise the variation in thickness. Once sanded, the surfaces show visible wood particles. The sanded panel has no decorative features, so it can be seen.

Panels calibrated on both sides have a thickness tolerance of ± 0.3 mm.

1.20 Storage

When ready for transportation, the panels are protected by a waterproof plastic screen. The side edges are protected with L-shaped cardboard, including those in contact with the packaging system straps. The pallet protectors should only be removed to acclimatise the panels to the application site.

Viroc panels should be stored in a covered area, protected from sunlight and rain, with a flat horizontal base. The pallets will be placed on supports that must be high enough (≥ 8 cm) to allow easy access by a forklift. The maximum distance between supports should not exceed 800 mm and the maximum distance between the 1st support and the top of the pallet should not exceed 210 mm.

If the pallets are stacked on top of each other, all the support bases must be aligned vertically to avoid deformation.

You can stack up to 6 pallets at a maximum height of 4 metres (see figure 1.13).

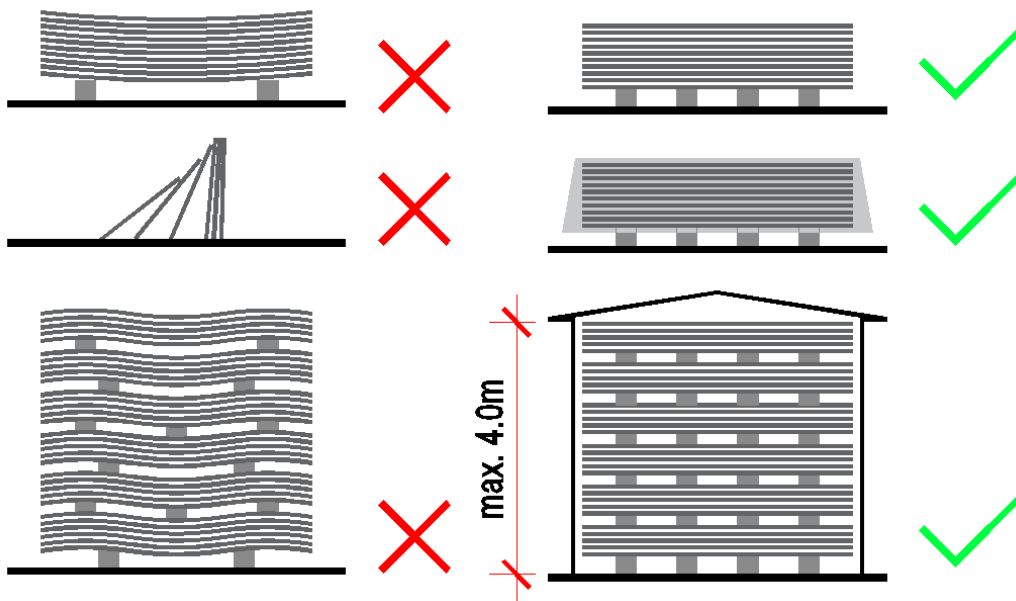


Figure 1.13 - Storage of Viroc panels

1.21 Handling

Whenever possible, panels should be handled using the appropriate equipment, such as forklifts, plate elevators, etc.

If the panels have to be moved manually, this process has to be carried out panel by panel, in a vertical position, so that they remain flat without deforming (see figure 1.14).

The panels have the weight indicated in section 1.10, so they should not be moved manually unless there are enough persons on site to perform it.

Good manual handling practices should be followed, using the appropriate personal security equipment and following the rules of the European Health and Safety legislation, Osha.Europa.eu (Factsheet 73):

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



Figure 1.14 - Viroc panels Handling

1.22 Acclimatisation

When it leaves the factory, the panel moisture level ranges from 6 to 12%.

To ensure proper installation conditions, the panel must adapt to the temperature and moisture conditions of the installation site. To do this, cut the straps around the pallets and remove the protective plastic sheeting. The panels should be left for at least 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, forming a concavity facing upwards. This phenomenon is natural and occurs due to the differential loss of moisture between the two surfaces. However, the process is reversible. The panel becomes flat again when both surfaces reach moisture equilibrium. To do this, you need to turn the back of the panel upwards and keep it that way until the balance is achieved. The same effect will be achieved by wetting the concave face (surface facing upwards) with water (see figure 1.15).



Figure 1.15 - Upper panel warping

1.23 Application

VIROC Portugal S.A. is the manufacturer of Viroc panels and does not apply them; the panels can be purchased from an authorised distributor directly by the contractors or subcontractors who carry out the application.

VIROC Portugal S.A. only supplies the panels. The fixings, structure and any other element can be purchased directly by the application company, provided they meet all the features specified in this Technical File.

Table 1 summarises the recommended thicknesses for each application.

1.24 Colour variation

When exposed to sunlight, the Viroc Panel undergoes slight colour changes, becoming a little lighter. This variation in tone depends on the colour.

In a colour evolution study carried out by the Polytechnic Institute of Viseu (IPV), the evolution of the panels when aged in different environments was measured.

The table below shows the average colour variations observed (Delta E) when exposed to the Xenon Chamber and QUV after 1500 hours of exposure.

Colour	Delta E	
	Xenon	QUV
Grey	7	2
Black	14	2
White	13	10
Yellow	6	1
Red	12	4
Ochre	13	3

1.25 Maintenance

Viroc panels are maintenance-free.

In outdoors applications where the panel is varnished or painted, an inspection should be carried out every 5 years to check that the varnishing or painting remains in good condition.

If no defects are found, a new inspection should be scheduled for five years later.

If there is marked wear or any deficiency in the varnish or paint applied to the panel, it should be cleaned with a jet of water with neutral detergent and repainted.

1.26 Technical support

VIROC Portugal S.A. has a Technical Department that can provide technical assistance during both the design and the execution phases of the project.

1.27 Declaration of Performance (DoP)

Under Regulation (EU) No. 305/2011 of the European Parliament and of the Council, which establishes harmonised conditions for the marketing of construction products, the Viroc panel holds a CE Marking Certificate and guarantees to comply with all the characteristics and properties declared in the declaration of performance.

The Declaration of Performance (DoP) is published on the Investwood website.

TABLE

Summary of applications by thickness

Application	Thickness (mm)								
	8	10	12	16	19	22	25	28	32
Façades			•	•					
Walls and wall cladding		•	•						
False ceilings	•	•	•						
Floor covering			•	•					
Beam-supported floors					•	•	•	•	•
Furniture	•	•	•	•	•	•	•	•	•

Table 1 - Summary of applications by thickness