4. HEMPcrete INSTALLATION: WALLS

4.1 THE MIX

<table>
<thead>
<tr>
<th>Material</th>
<th>For 1m³</th>
<th>For 1m² (250mm wall)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulcore/Hemp wood</td>
<td>1000 Ltr (100kg)</td>
<td>265Ltr (26.5kg)</td>
</tr>
<tr>
<td>Insulime</td>
<td>250kg</td>
<td>66.25kg (2.65kg bag)</td>
</tr>
<tr>
<td>Water</td>
<td>300 - 350Ltr</td>
<td>80 - 92.5Ltr</td>
</tr>
</tbody>
</table>

1m³ of hemp gives 950 litres of hempcrete mix.

The true material calculation is: wall thickness x length x height = m³ X 1.05

Or add 1m³ of product to every 20m³ of wall volume.
For manual application add a waste allowance equivalent to 3% of the total, depending on scale, site and duration of job.

4.1.1 Hempcrete wall mix has the following properties:

Please refer to Appendix charts, Weight & Thermal Properties.

- **Density:** 400 - 420kg/m³
  - 105kg/m² (250mm wall thickness)
- **Elasticity:** 15 - 30 MPa after 90 days
- **Resistance to compression:** 0.2 MPa after 90 days
- **R rating:** 3.2

Mixing method as described in Chapter 3 - Installation: General

4.2 GENERAL

In a ‘wall’ application, hempcrete is used to infill around a framework.

Hempcrete is **NOT** a load-bearing material.
It is **NOT** designed to withstand roof-loads etc. The wall frames are load-bearing and must be engineered to AS1684.

The hempcrete walls will function as an exterior wall cladding to AS 3.5.3 with an insulating performance according to AS 3.12.1.3.

In all cases, the hempcrete wall infills must have a protective covering on the external face e.g. render, cladding etc.
4. Hempcrete Installation: Walls

The following two configurations can be produced:

2. Configuration 2: wood framework visible on one face. See figure 7.

### 4.2.1 Support/underpin joists

At all times, the wall structure should be engineered with consideration of the additional weight of the hempcrete insulation. Freshly mixed hempcrete weighs approx. 70% more than when dry.

**IMPORTANT:** It is crucial to reinforce joist ribs and bearers until the wall has dried. Please refer to Appendix, Weight Properties chart.

### 4.3 WALL PREPARATION

#### 4.3.1 General

- Timber that is surrounded by hempcrete would preferably have a rough surface.
- Keys or ties should be installed, especially if the frame is not surrounded by hempcrete. A small lath frame in a dove-tail shape will aid the grip of the hemp (concrete chairs can be used).
- Hempcrete thickness from the outside of the wall to the frame (or any other member) must be a minimum of 70mm, depending on the dimensions of the wooden structure. See Hempcrete Minimum Covering Chart, page 29.
- Any hempcrete corners that could loosen due to lack of grip onto timber should be secured with keys such as blocks, nails, screws or netting attached to the timber members.
- Any steel such as lintels, triplegrips, tiedowns and bracing which is embedded in the hempcrete should be stainless or galvanized steel, treated with a bitumen-type coating as per corrosion protection to AS/NZS 4534, AS 1397 & AS 1214.
- **Bathroom:** Hempcrete is not to be applied on walls in very damp areas. If used in bathrooms, then adequate additional ventilation and a false wall should be installed leaving a ventilated gap between the hempcrete wall and the waterproofed bathroom wall. See Figure 10.

#### 4.3.2 Post and Beam

The frame can be mounted on the outside, in the middle or on the inside of the wall face.

To avoid thermal bridging, the frame is ideally installed on the inside or the middle of the hempcrete wall.

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**Figure 1:**

**Brick veneer onto hempcrete wall.**

Fibre cement sheet is attached to battens. There is a well ventilated cavity of min. 20mm between the hempcrete wall and the fibre cement sheet. The brick veneer is mounted with lime mortar.
Figure 2:
Chamfer board onto hempcrete wall.
There is a well ventilated cavity of min. 20 mm gap between the breathable sarking paper and the hempcrete wall. The battens are secured on to the frame.

Figure 3:
Timber lining on interior hempcrete wall.

Figure 4:
Tiled hempcrete wall.
Please note, this is not suitable for a wet area! See Figure 10 for wet area.
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base coat of render. See 7.4.1 on Render. The groove should be at least 30mm under the finished render coat to avoid a visual line after the final coat.

■ Electrical conduit and sockets should be installed as per AS 3.4.2.6. See Figure 15.
■ Allow a minimum of 28 days for hempcrete to dry before loading the electrical circuit.

4.7 DRYING

Drying of hempcrete walls and renders must be monitored at all times.

Drying is influenced by:

■ weather conditions and
■ protection of the walls.

Curing or setting of hempcrete occurs when the lime bonds during a chemical reaction between the binder components. Curing is complete in approximately 28 days.

The drying process is the release of moisture from within the mix to the outer surfaces and into the atmosphere. This can take up to 90 days. During this time almost 90% of the free water will have been released.

**Carbonization** of lime in the binder happens over a period of approximately five years. This ongoing process results in the petrification of the hemp particles.

**Caution**

Fast drying, which occurs when wind combines with full sun, should be carefully monitored. If a wall dries too quickly, the outside will dry faster than the inside, resulting in a denser outer surface/crust which will slow down drying of the inner layer. This can result in the inner core moisture being higher than that of the outer layer and will lead to poor carbonization of the lime. This in turn has consequences for thermal performance bracing and strength.

In this case, partial covering of the walls might be preferential.

Each situation must be assessed individually.

**Points to keep in mind:**

■ Allow sufficient and constant ventilation around the walls.
■ Do not store materials where they may hinder airflow.
■ Leave windows, louvres and doors open to encourage air circulation.
■ In still weather conditions, a fan can be used to encourage airflow, but do not ‘force dry’ by directing fans at the walls.
■ Take care and use dehumidifiers when buildings are sealed. Monitor the humidity in the building.
■ A humidity tester can be used to monitor drying. Ref: [www.domosystem.fr/en/products/instruments-1/material-moisture-meter-2](http://www.domosystem.fr/en/products/instruments-1/material-moisture-meter-2)

Drying is a most important part of the job. Ensure all procedures are followed!

Hempcrete needs time to dry. Remember that the building will last for a very long time, so give it some time to dry in order to last that long!
During the first three to four days the walls should be monitored to ensure slow drying, especially in very humid weather conditions or in conditions with dry warm winds (dampening down of the exterior wall might be needed).

Protection of the work is very important. Any water contact with unfinished hempcrete will delay drying and influence the performance of the walls. Therefore walls that have been in contact with water will have to be rendered at a later stage.

The exposed surfaces of the finished walls, tops of walls and openings should remain protected from exposure to water, through the use of tarps, roofing and the management of excess water with flashings and storm water pipes.

4.8 WALL FINISHES

Wall finishes are applied after complete drying of the hempcrete.

Drying time depends on the ventilation of the area, the ambient rate of humidity and hempcrete thickness.

Drying typically, takes about 30 to 60 days for a thickness of 250mm. This drying time can vary depending on local conditions.

Good ventilation reduces drying time.

Any protective coatings or finishes must be permeable to vapor and have a water resistance factor of at least WP 0.85. See chapter 8.

Consequently at least one face of the construction must be left without impermeable cladding.

4.8.1 Protective coatings

Three types of protective coatings are painting, rendering and cladding:

**Painting – external:**
- Lime wash
- Lime paints

Please note: areas exposed to rainfall will have to be coated with a breathable render.

**Painting - internal:**
- Lime wash
- Clay paints
- Breathable paints

**Rendering**

The rendering recommended for hempcrete is *Rockcoat Lime Plaster HB*.

The main external rendering can be applied after hempcrete walls have dried for minimum of 30 - 60 days.

Clay renders are breathable and can also be used for internal applications.

See Chapter 8: Render Finishes on Hempcrete Walls.

The use of any other protective coating must be justified by prior tests to check for compatibility and adherence. If unsure please consult with Hempcrete Australia.

Protective coatings can be given finishes such as paint or colour washes, or colored throughout. Humidity impermeable finishes must not be used.

A minimum of two render coats are required. The first coat should be 15-25mm thick, the second coat 5-8mm thick, and a thin 2-4mm finishing coat of permeable paint.

The densest and coarsest coating of render should be applied first to eliminate the possibility of water penetration.

**Cladding**

Cladding should be carried out in accordance with AS 3.5.3.

A well-ventilated minimum 20mm gap is required between the hempcrete and the breathable damp barrier as recommended in the standard.
This is a preview from the Hempcrete Australia Installation Manual 3rd Edition.

For the full version please contact Hempcrete Australia to register for the training course, or to gain further information and technical support.