GENERAL GUIDELINES
ECO BUILD
HEMP MORTARS using St. Astier limes

BATICHANVRE – NATURAL HYDRAULIC LIME BASED BINDER FOR HEMP

Hemp is a natural material suitable for making light weight insulating mortars. Its density varies between 110 and 150 kg. per m^3. The strands are between 5 and 25mm long. The thermal conductivity of hemp is 0.05 W/m.K.

Particular attention has to be paid in making sure that hemp is not subject to dampness either due to stocking conditions of the raw material or capillary action in hemp mortars (adequate damp courses if constructing walls or insulating/draining ballast base in concrete should be in place).

The qualities of St. Astier natural hydraulic limes are ideal for making hemp mortars. A special binder (Batichanvre) has been prepared for making Hemp mortars.

INSULATING HEMP/LIME CONCRETE

Dosage: 1 bag of Batichanvre (35kg.) + 100 litres of hemp + (optional)5 litres of coarse sharp sand (5mm down)

Water addition : 35 to 40 litres

Mixing in paddle mixers	Mixing in drum mixers
Introduce the hemp and the sand. Whilst turning, spray with water mist until the hemp dampens (colour change). Introduce the Batichanvre and continue to spray until an homogeneous mix is obtained. Total mixing time is about 5 minutes.	Introduce about 30 litres of water and the Batichanvre. Mix for 3-5 minutes to obtain a milky paste with no lumps. Add the loose hemp and mix for about 5 minutes to obtain the required mix adding the rest of the water. The completed mix should be rather dry and lean. Total mixing time is about 8-10 minutes

Application –

Directly on soil: on a well levelled and compacted soil, if necessary stabilised **, construct a 15-20cm. ballast base. Do not use any plastic sheeting.
On wood: provide a 2 cm. layer of hemp directly on the surface without plastic sheeting.

Apply the hemp concrete in layers of 5 cm. maximum and level with a rake. Compact by tamping. To obtain the highest thermal insulation this first layer should not be compacted (this will be suitable in loft insulations where the highest compressive strength is not required). The final layer will be levelled with a straight edge, compacted and floated with a wooden float.

*** Soils can be stabilised by rotovating 200kg. of NHL 5 to 1m^3 of damp soil. Extra water can be added in dry soil. Do not saturate to avoid a longer drying time.*

GENERAL GUIDELINES
ECO BUILD
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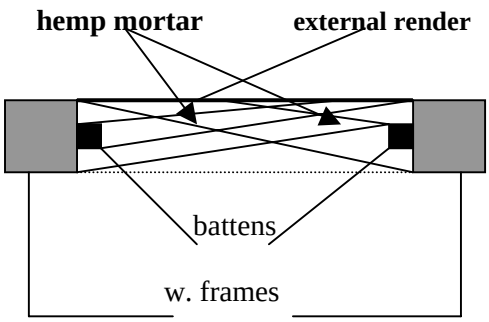
The minimum thickness of the hemp/lime insulating concrete is 8 cm. At this thickness the thermal conductivity of the concrete will be between 0.11 to 0.13 W/m.K depending on the compaction. The compressive strength at 90days will be about 1.8 N/mm^2.
The production is 800 to 850 litres of mortar per m^3 of hemp + 10 bags of Batichanvre, depending on compaction.

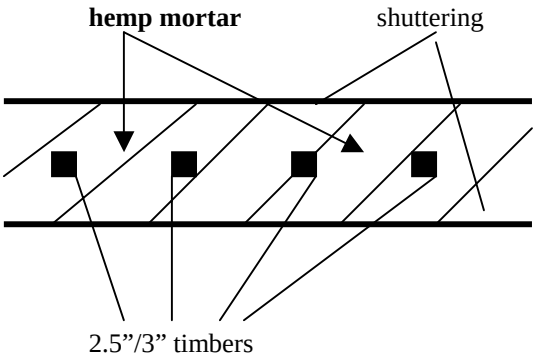
Tiles, wooden floors or carpeting can be laid on a further 4-6cm. lime concrete screed suitably finished after the total drying of the work (**up to 90 days depending on thickness and climatic conditions**). Keep the area well ventilated and avoid forced drying. Underfloor heating circuits may be laid in the screed as in normal practice.

Walls construction



Timber framed walls

Fix 2" x 2" wooden battens at the middle of each frame. Shuttering between frames must leave room for final render/plaster (15-20mm). Place the mortar in layers of 5-10cm. and compact before next layer.



Walls

Construct shuttering to allow for the required thickness of the final render/plaster. Insert timbers into the mortar. These should be totally covered by the mortar with a thickness of minimum 7 cm. depending on the size of the timbers used. Place the mortar in layers of 10-15cm. and compact before next layer. Pipes, plugs etc. should be positioned previously or as the work goes on

Shutterings max. 1 m. high. Once the first level is completed, fix the second level panels and apply a second layer of mortar, about 25cm. and compact. Only then may the lower panel be removed. The first level mortar has to remain enclosed for min. 30 minutes. Apply same method to the remaining levels.

If a plaster or render is going to be applied, movement joints should be used every 9m^2.

Dosage, mixing ,water addition and production: as per hemp/lime concrete

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ECO BUILD
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External render and internal plasters:

Use NHL 2 for base and finishing coat once the structure is completely dry (approx. 60-90 days depending on weather conditions and thickness). Protect external work from adverse weather conditions. Internal plaster should at all times have a NHL 2 base coat before different finishes, if required, are applied (EcoMortar F, fine plasters, lime paints etc..).

Maximum areas allowed: $3m^2$ for wooden frames and $9m^2$ for walls.

LOFT INSULATION MORTAR

This lightweight mortar does not have high mechanical performance.

Mixing: in paddle or drum mixers (same procedure as described in the Hemp/Lime concrete section).

Dosage: 1 bag of NHL 2 (or 1 bag of Batichanvre) + 200 liters of Hemp + 35-40 liters of water.

Consumption: $1m^3$ of insulating mortar requires 1.05 m^3 of Hemp and 5.25/5.5 bags of NHL 2 or Batichanvre.

Thermal conductivity of this mortar is: 0.09W/m.K.

Application: loosely apply about 2 cm. of dry hemp between the floor timbers. Place the mortar above this layer at a thickness of min. 15 cm./max. 25 cm. Make sure that the hemp mortar level is about 1 – 2 cm. over the final required level to allow for compaction. Lightly compact the mortar to bring it to the required level. If a floor is required, make sure that there is a space of about 2cm between the top level of the insulating mortar and the floor boards.

INTERNAL WALL INSULATING RENDER

On a properly prepared dry background apply a **stipple coat** as follows:

1 volume of NHL 5 to 2 volumes of coarse sharp sand.

The hemp/lime mortar can be applied wet on wet (after 12 hours or so) by laying on or casting on.

The hemp/lime mortar dosage for ***a natural finish*** is:

2 bags of NHL 2 + 100 litres of hemp + 60/70 litres of water

The thickness of the render averages 5cm (up to 8cm.). It is applied in layers of 2-3 cm. at about 20 to 90 minutes interval between each pass. The last coat (2 cm.) to be applied 24 – 48 hours after the previous coat. This coat will be floated to achieve the required finish. Consumption: 27kg of NHL2 + 55 liters of Hemp for 1 m^2 of render @ 5cm thickness.

GENERAL GUIDELINES
ECO BUILD
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If a ***decorated finish*** is required use Batichanvre instead of NHL 2 and proceed as above. The decorative finish (lime wash, Ecomortar, stucco etc…) can be applied after a drying period of 45-90 days. Consumption: 38.5kg of Batichanvre + 55 litres of Hemp for 1m^2 of render @ 5 cm. thickness. The thermal conductivity of the above renders will be between 0.11 to 0.13 W/m.K. The density of these mortars will be between 0.75 and 0.85 kg. per litre, depending on the compaction

In all cases the surfaces should not exceed 15m^2 without movement joints. Walls should have a damp-course to avoid moisture transfer by capillary action.

The information supplied in this document is for general guidance only. It recommended that test panels are constructed in all cases.

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