



hemp building



a hempcrete garden office with a living roof

what is it?

It's building with hempcrete - a mix of 3 things: hemp 'shiv' (hemp is a plant that has been used for millennia for textiles. Shiv is the waste from the textile industry – the woody / pithy core of the stems); lime binder; & water. These components are used in different ratios depending on the strength or insulative properties you require.

Hempcrete is used for walls, floors or as an insulation layer in roofs / ceilings – but it's not structural, i.e. it's not strong enough to support the weight of a building alone, so it is cast around a timber frame, providing stiffness and insulation. It means that the frame is a lot simpler than other timber-framed buildings. A floor would have more lime binder for strength and durability; walls would have less binder and more hemp for insulation; and roofs / ceilings less lime and more hemp still. Hempcrete is mixed and then tamped into shuttering to fill the space between the studwork / frame. There are also hemp plasters for adding an insulating and finishing layer to solid walls.

In areas where hemp is grown, the shiv has been used for generations as animal bedding. Its use in construction started in France as a way of replacing wattle and daub in traditional properties, because it has the same stiffness, breathability and flexibility, but provides insulation too. Specialist companies producing lime binder for hempcrete appeared in France, then other European countries, and also Canada – and it's starting to make an appearance in the UK now.

NB: the hemp grown for construction and fibres is *Cannabis sativa sativa*, and the medicinal and recreational drug is from *Cannabis sativa indica*. The former has around 0.3% THC content (the substance that produces the cannabis 'high'); the latter has between 6-20%, but its fibres aren't good for construction or textiles.

what are the benefits?

environmental

- if used correctly, you can build a 'carbon-negative' building (i.e. not just carbon neutral, but one that locks up more carbon than is produced in making it), because of all the carbon locked up in the timber, hemp and lime. This is because the lime in the hempcrete 'petrifies' the hemp, replacing the cellulose in its cells with lime (a bit like a fossil), so that it won't rot, and give its carbon back to the atmosphere – except on an extremely long time-scale. It can lock up to 110kg of carbon per m³ of walling material (it weighs c. 275kg / m³, most of which is hemp)
- it's completely natural, requires very little processing - or transport, if grown locally
- hemp is resilient, and requires very little in the way of pesticides
- it's lightweight, and so requires less fuel for transport, and shallower foundations, which can mean a 75% reduction in concrete – or even different kinds of foundations that don't require any concrete at all
- hempcrete has great thermal properties - very low u-values and thermal inertia - i.e. hempcrete buildings change temperature slowly, reducing heating requirements

other

- it's very versatile – it can be used as a replacement for bricks and mortar, plaster or plasterboard; it can be used as a breathable solid floor; as solid walls that can be internally clad or plastered; a solid roof / loft insulation; or as a plaster. English Heritage recommend it for old timber frame infills. It has mainly been used in historical building restoration, but it is increasingly being used in new builds



a field of hemp growing on a farm in France



- it's very simple once you know how to do it (i.e. it's skilled work, but low-tech). It's just one material providing stability and insulation – replacing bricks, mortar blocks, insulation, cavity, cavity ties / closers, plasterboard etc. It's solid, with no cavity, and can be directly rendered externally, or plastered, clad or limewashed internally
- it allows lots of artistic licence – you can build curved or unusually-shaped walls (as long as you can make your shuttering that shape), and you can embed things in it, like different-coloured bottles
- its flexibility and breathability makes it ideal to use with other natural materials, and especially in traditional buildings where inflexible and non-breathable materials like cement can and have caused lots of damage
- it regulates moisture content; if your room is too humid, the wall absorbs moisture and either releases it outside, or holds it until the room is dry, and then releases it. This prevents the growth of moulds
- you can self-build. You'll need training – especially in the mixing of the hempcrete – but it's nowhere near as complicated as conventional buildings.
- it's Building Regs approved (however, when you approach them, the person you speak to will almost definitely know nothing about it)

what can I do?

If you'd like a quote or a consultation from a hemp builder, contact LILI. If you'd like to self-build, or to know more about it, get some training and/or a book. You could also visit a hemp building – there are two open to the public, one at the BRE, and one at CAT.

If you do decide to self-build, you could start with a shed or a project that won't cause too many problems if it goes wrong. Whoever is doing the building (even an experienced builder), it's essential that they've been properly trained, because although it's a simple building technique, the mixing ratios and techniques are difficult to get right. You need to think about health and safety, as lime can be dangerous to work with. You'll need masks, goggles and gloves to the elbows.



removing the shuttering to expose a raw hempcrete wall

Lime binder creates a lot of dust when being mixed with the shiv and the water.

Materials: you'll need hemp shiv specially produced for building. It's available from LILI, together with the lime binder. Plus Steve Allin's book or a course will explain how to make your own lime binder.

Tools: you can use simple offcuts of timber to tamp the mix down into the shuttering. For mixing you could use a cement mixer, but it's not ideal as it's very slow and it's difficult to get the right consistency. It might be better to hire an agricultural 'pan' mixer from a local plant hire company (should be around £250 per week).

You'll need specialist building skills to make the timber frame of course. The frame can remain exposed internally, or the shuttering can be built outside the timber frame so that it can't be seen when the shuttering is removed. You can also make your own shuttering from ply.

resources

- see LILI for courses, books and links to sources of more information; plus you can purchase hemp shiv and lime binder.
- Steve Allin, *Building with Hemp* - from LILI
- hemplime.org.uk - Hemp-lime Construction Association: information, promotion, research
- internationalhempbuilding.org - International Hemp Building Association: promoting hemp building world-wide

Contact us or visit our website to find out more about our message, networks, factsheets, books, courses, products, services, magazines, links, forum, events and volunteering on organic farms. You can also become a Friend of LILI, receive our e-newsletter, and help us change the world.

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