

Tradical® Hempcrete Technical Information Sheet Thermal Walling

Tradical® Hempcrete is a two-component material mixture of Tradical® PF70 or Tradical® Thermo lime binder and Tradical® Chanvribat® building grade hemp hurd. The Tradical® PF70/Thermo is a lime based pre-formulated binder that is in powder form. The building grade hemp hurd is specially selected and chopped, woody core (shiv) of the industrial hemp plant. When combined together in appropriate proportions and mixed with water the resulting mixture becomes Tradical® Hempcrete.

Tradical® Hempcrete can be used to form the solid thermal walls of framed buildings and provides an excellent, breathable, insulation wall form. The mixture can be cast into moulds of all shapes and sizes to form pre-cast blocks and panels both on and off site. Tradical® Hempcrete is a non-structural, lightweight material that has vapour phase change characteristics delivering low energy buildings with the potential to achieve negative carbon footprints.

Product Benefits

- Easy to use – just mix and add water
- Packaged to provide simple mixing ratio of two component mix
- Adaptable building material and can be formed to almost any castable shape
- Light weight, low density leads to efficient construction processes
- Excellent synergy with other natural building products
- Good fire resistance
- Excellent acoustic qualities that limit noise transfer
- High insulation performance attributable to air pockets in filler material
- Hygrothermal characteristics of a vapour phase change material
- Effective thermal inertia delivering temperature change buffering
- Passive humidity and temperature regulation
- Carbon capture from the atmosphere during industrial hemp growth
- Carbon re-capture from binder production through carbonation

Technical Product Data for wall mix:

(2 bags of Tradical® PF 70/Thermo lime binder for 1 bale of 20kg Tradical® Chanvribat® building grade hemp hurd)

| TYPICAL DATA* | |
|---|---|
| Characteristic | Data |
| Typical Compressive Strength (EN 1015-11) | 0.8 – 1.0 N/mm ² |
| Typical Flexural Strength (EN 1015-11) | 0.3 – 0.4 N/mm ² |
| Fire Rating (CSTB EN1363-1) | 5.53 hrs/m |
| Fire Resistance (CSTB EN1363-1) | 1.66 hrs/300mm |
| Acoustic absorption | 0.6 @ 0.2metres |
| Acoustic absorption | 0.7 – 0.76 @500/0.1metres |
| Mean Acoustic Absorption Coefficient | 0.69 NRC |
| Air Permeability | 0.75 gm/m ² /mm hg |
| Vapour Permeability | 24.2 gm/m ² /mm hg |
| μ vapour diffusion resistance | 4.84 |
| εΦHygric capacity | 10.2 – 15 % |
| Thermal conductivity λ @ 330kg/m ³ (EN 12664) | 0.085 W/mK |
| Heat Capacity | 1400 – 1550 J/kg |
| Carbon capture @ 330kg/m ³ (EN14040) | 108kgCO ₂ (equiv)/m ³ |
| Achievable Airtightness (m ³ /m ² .hr at 50 pa) | <2 |

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*Data obtained from various sources and some data derived from tests on materials manufactured from different raw materials supply. Target density for mixed Hempcrete wall material for testing is 330kg/m³. Some test data from samples of greater density.

How to Use

Tradical® Hempcrete can be cast or sprayed in situ or off site. Casting is a straight forward method of application and can be readily achieved with a minimum amount of training. For construction professionals familiar with casting concrete this can be provided as a tool box talk. Non-professionals can also achieve cast hempcrete constructions following the toolbox talk although production efficiency and quality will depend upon the practical capabilities of those involved.

Spraying Tradical® Hempcrete requires bespoke equipment or modified pneumatic dry spray concrete machines and trained operatives. We would only recommend that spraying is carried out by members of the Sprayed Concrete Association who have received training in the application of Tradical® Hempcrete.

Mixing

Tradical® Hempcrete mixing for casting should for best results be achieved using a pan mixer. The volume of the mixer and the mixed volume will determine the mixing time duration. Ideally the material should be mixed until all added water has been absorbed and the mixed material has the consistency to hold form as a ball when squeezed by hand, all of the hemp shiv is coated in the binder slurry and the mix has a uniform colour.

Practical Aspects. Part L Building Regulations data

| INSULATING WALL and INSULATING LINING applied between wall and shuttering | | 200L Hemp Shiv 2 bags Tradical® PF70 | 200L Hemp Shiv 2 bags Tradical® THERMO |
|--|-----------------------|---|---|
| CHARACTERISTICS | | | |
| Concrete mixed at | 220 kg/m ³ | 180 kg/m ³ | |
| Mass density | 320 kg/m ³ | 280 kg/m ³ | |
| Thermal conductivity | λ = 0.085 W/m.k | λ = 0.076 W/m.k | |
| Compression strength (at 90 days) | 0.9 MPa | 0.7 MPa | |
| THERMAL PERFORMANCE RATINGS | | | |
| 15-cm-thick wall | R = 1.8 | R = 2.0 | |
| 20-cm-thick wall | R = 2.4 | R = 2.6 | |
| 25-cm-thick wall | R = 2.9 | R = 3.3 | |
| 30-cm-thick wall | R = 3.5 | R = 4.0 | |
| 35-cm-thick wall | R = 4.1 | R = 4.6 | |
| 40-cm-thick wall | R = 4.7 | R = 5.3 | |
| R in (m ² K/W) | | | |

Physical characteristics – dependent upon ambient conditions and circumstances of application.

| TYPICAL DATA – GUIDANCE ONLY | | | |
|--|--------------|----------------|----------------|
| | Sprayed Wall | Cast Wall | |
| | | PF70 | Thermo |
| Mixing Time | N/A | 3 to 5 minutes | 3 to 5 minutes |
| Open time (workability) | Up to 24 hrs | 3 to 6 hours | 3 to 6 hours |
| Initial set for placed material | 2 to 4 hours | 3 to 6 hours | 3 to 6 hours |
| Temporary shutter removal time limits | 24 hours | 24 hours | 2-4 hours |
| Drying time prior to wet finishes application (300mm thick wall) | 7-14 days | 30-60 Days | 20-30 Days |

Packaging

Tradical® PF70 and Tradical® Thermo are packaged in water resistant paper sacks of 22kgs and 18 kgs respectively. Tradical® Chanvribat® building grade hemp hurd (shiv) is packaged in recyclable polymer bales of 200lt (20kg) capacity when packed. These pack sizes are determined to facilitate simple mixing ratios for Tradical® Hempcrete. Wall mix ratio is 2 bags of Tradical® lime binder to 1 bag of 20kg Tradical® Chanvribat® building grade hemp hurd.