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CONDUCTIVITY TESTING OF PANELS CAST WITH HEMP ECO SYSTEMS' FORMULATION

Formulation

20 kg hemp shiv
25 kg hydrated lime
3 kg additive
Abt. 30-40 litres of water

> ➤ Proportions used for mixing in a 200liter pan mixer:
> - 10kg of hemp
> - 20litres of water
> - 1.5kg additive
> - 12.5kg of hydrated lime

Casting Procedure

- Placed hemp into pan mixer and loosened clumps of fibre by hand
- Added the majority of the water
- Mixed for 3-4min
- 1.5kg of additive slowly added
- Mixing continued while lime was added and the rest of the water slowly; mixed for 3-4min until a consistent mix was achieved.

The mixture was shovelled into square moulds (filled on the flat) and taped gently into all the corners. Once filled the moulds were levelled off with a levelling stick. Cylindrical moulds were also filled and tamped under their own weight, by dropping the cylinder onto its base; this provided a much better consistency and matrix.

The dimensions of the moulds were 600mm x 600mm x 100mm and diameter of 150mm by 300mm high.

All samples were cast on **17th April 2013**
Initial weight of each sample:

	Square mould	Cylinder mould (a)	Cylinder mould (b)
S1	20.9 [Kg]	2.8 [Kg]	3.1 [Kg]
S2	20.8 [Kg]	3.1 [Kg]	3.0 [Kg]
S3	21.9 [Kg]	3.4 [Kg]	3.5 [Kg]

NB mass of mould (4.2kg – Square and 0.5kg – cylindrical) included

Equipment

- The masses of the samples were measured using a KERN DE300K100N scale with a max capacity of 300kg and accurate to 100g.
- The dimensions of the sample were verified using a standard steel meter rule; accurate to 0.5mm although realistically able to measure to ±1-2mm accuracy due to sample roughness. The thickness of the sample was automatically measured by the HFM, when tested, with an accuracy ± 0.025mm.
- Volume was calculated by multiplying the plan area of the sample by its thickness. The density of the sample; its weight divided by the volume occupied.
- The conductivity was calculated by the Heat Flow Meter FOX600 Series produced by LaserComp, Inc. USA.
- All samples were wrapped in Clingfilm before testing, and setpoints of temperature difference and mean temperature were set as recommended in the operating manual of the FOX600 Series, listed below in results.

Testing

Sample 1 was tested on: 24th June 2013; taken straight from the conditioning room at (60%RH; 20°C) and wrapped in Clingfilm before testing.
Sample 1 was then retested on the: 1st July 2013.
Sample 1 was dried in an oven until its mass did not change by more than 0.2% during 24 hours and tested in this dry state on: 18th July 2013.
Sample 2 was unconditioned and tested on: 22nd July 2013.

Results

Sample 1 WET	Tested- 24/6/13	330-380 kg/m³	MC = 40-60 %*
Mean Temperature	Delta	Percentage Difference	Thermal Conductivity
[°C]	[°C]	[%]	[W/mK]
5.02	12.25	10.97	0.06818
10.02	12.25	0.88	0.07034
20.03	12.25	7.32	0.07714
30.03	12.25	3.51	0.08676

Sample 1 DRY	Tested- 18/07/13	238.89 kg/m³	MC = 0 % (assumed)
Mean Temperature	Delta	Percentage Difference	Thermal Conductivity
[°C]	[°C]	[%]	[W/mK]
10.02	22.5	2.32	0.05735
12.52	22.5	3.04	0.05797
20.02	22.5	6.00	0.05978
30.02	22.5	4.50	0.06284
40.02	22.5	4.17	0.06427