

Raw Material Mix Testing

Experiment code:	Measuring method: Sand/Sawdust = Volume Cement/Water/Cactus Juice = Weight
Test batch #: 014	Mixing method: Hand held mechanical paddle mixer
Date: 22/05/18 Start 10am– Finish 11.10am	Vibration method: Stick/rod tamping
Weather conditions: 19 degrees, Southerly wind 20kph, Humidity 38%	Drying method: In forms. Forms removed at 12pm. Dry on batch table
Test sample type: Brick	Number of samples created: 3 x bricks 1x 30mm paver
Mould size/type: Standard house brick (230L x 110W x 86H mm)	Mix Ratio: Sand/Sawdust/Cement = 6:4:3

Materials Used in Testing

<i>Materials</i>	<i>Quantity</i>	<i>Materials</i>	<i>Quantity</i>
Water	2.240kg.	Basalt Fibre (+ length)	
Sand	7L (10.404kg.)	Basalt Mesh	
Cement	3.333L (3.969kg.)	Basalt Rebar	
Sawdust (sieved hardwood)	3L (1.006kg.)		
Plasticiser	50ml.	Cactus Juice	0.820L (0.843kg.)

Notes / observations:

This test used blended prickly pear cactus leaf pads. The watery juice was used in the mix, not the pulp. The amount used in the test was simply the amount available that was juiced at the time which equalled 820ml.

Started with Cactus Juice (0.843kg) and Water (1.157kg) totalled up to 2kg to get the mix going. 0.6 water/cement ratio = 2.380kg. Not wet enough yet. Continue to add water until mix became workable (additional 1.083kg) beyond 2kg starting point. Consistency had just enough water to hold together when a trowel was placed in the mix bucket and smooth out some of the mix. Enough also that some water came to the surface.

A very nice balance between dry and moist enough to work. Tamped into forms. Trowelled easily. Pulled a little bit away from the starting edge on a trowel sweep of the surface but not anything of concern. Was a bit like sandcastle sand. Could smell the cactus still even when mixed, sort of like cut grass.

Zero slurry bleed out of the bottom of the formwork. Enough moisture in the top of the mix once worked.

Some of the Cactus pulp which was almost soufflé in consistency was added to the top of the paver and trowelled in to see what would happen upon drying.

Removed formwork at 12pm, (approx. 1hr. after pouring). Form slid off easily. Brick were well consolidated and held up when form removed, no slump.

Actual Water (including Cactus Juice) to Cement ratio = 0.77:1. This is still a little too excessive for good compressive strength. Looking for a figure of 0.6 – 0.7:1 which is typical of an ordinary driveway.

38% of liquid content in this mix was cactus juice.